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CLEAR CHOICE TEST

CLOUD MANAGEMENT: PART II

Fly the public cloud on autopilot

Powerful automation helps manage cloud-based jobs from start to finish. **Page 32** ▸

Windows Phone 7, cloud services to grab spotlight

BY JON BRODKIN AND JOHN COX

AT MICROSOFT'S annual TechEd conference in New Orleans this week, industry watchers are looking for the company to feed the buzz around Windows Phone 7, and share details about its cloud computing strategy in general and Azure cloud services in particular.

With Windows Phone 7, Microsoft is making a risky bid to win a big piece of the mobile market. But its mobile news, if there is any, won't be able to escape comparison to Apple's expected news this week around the iPhone OS 4.0 release and possibly a fourth-generation iPhone handset.

To sustain the positive buzz around Windows Phone 7, Microsoft needs to keep courting developers, who so far have been working with early versions of both the operating system and development tools. On their wish lists are real handsets that meet the Windows Phone 7 hardware

▶ *See* **TechEd,** *page 24*

WAN optimization: brings broad benefits

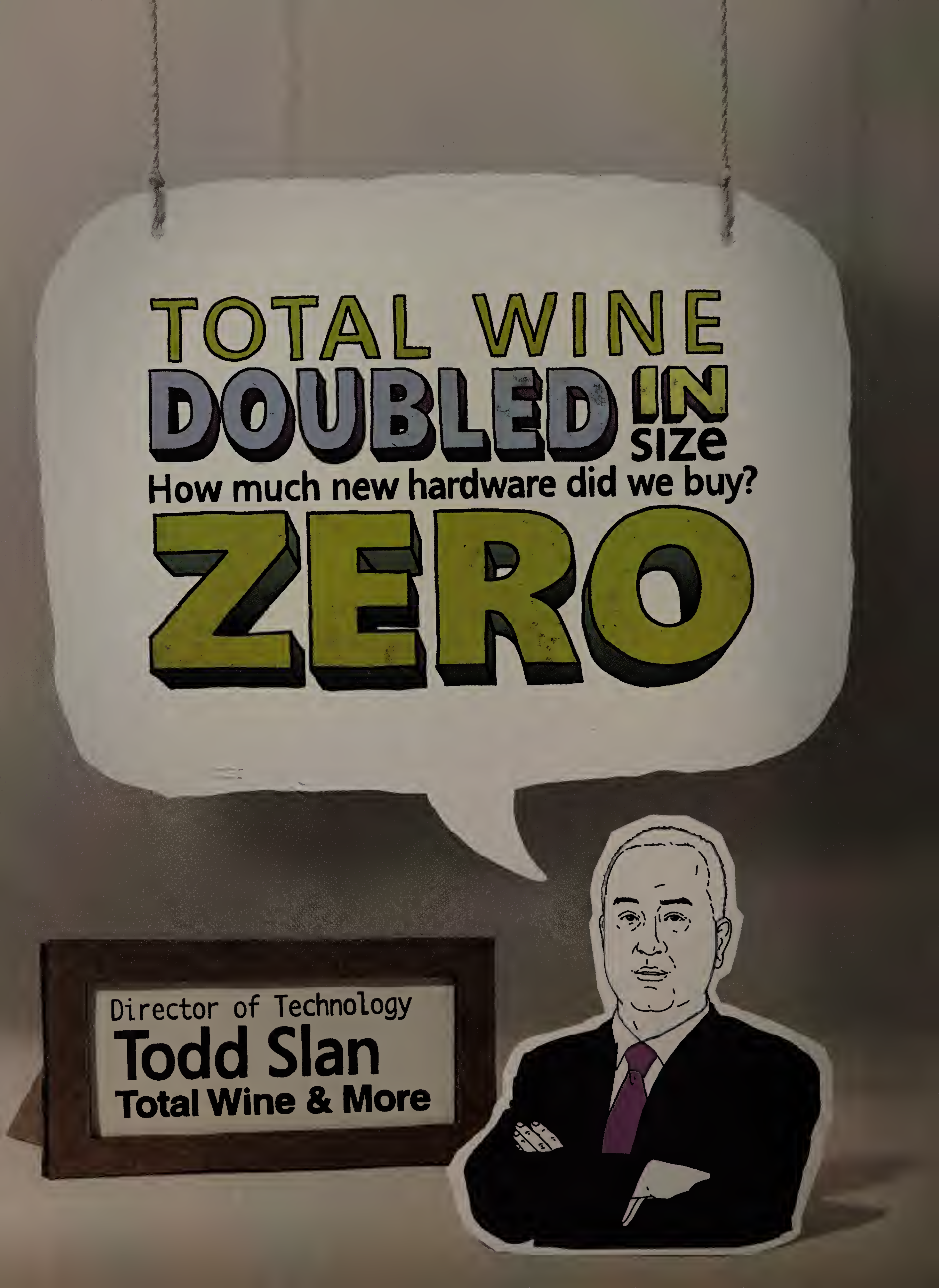
BY TIM GREENE

WHILE THE benefits of WAN optimization are well documented — better application performance, for example — the right gear can address unforeseen business goals as well.

Blue Coat customer Michael Shisko, director of IT for Hitachi Consulting, says his company started looking for WAN optimization gear when it switched from an Internet VPN to a hub-and-spoke MPLS WAN service. Shisko says that while 60% to 70% of the company's VPN traffic was ineligible for optimization because it was to and from Web sites, 100% of the MPLS WAN traffic was eligible. The company tested WAN optimization devices from Silver Peak, Riverbed and Blue Coat.

"The response was a remarkable dud," he says. Tests showed dramatic statistical improvement in performance,

▶ *See* **WAN,** *page 25*



TOTAL WINE DOUBLED IN size

How much new hardware did we buy?

ZERO

Director of Technology

Todd Slan

Total Wine & More

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CASE STUDY: Total Wine and More

Total Wine & More is "America's Wine Superstore," operating 54 stores in 11 states and carrying thousands of different wines, spirits and beers. With the company's success and growth has come a proliferation of servers in stores and at headquarters to support new business initiatives—and with those, an increase in technology management work. To relieve the IT staff of the need to manually manage servers, Total Wine took advantage of solutions in the Microsoft® System Center suite of solutions to automate server imaging, application and update deployment, server monitoring, and backup.

With fewer technology management chores, Total Wine can grow its business and roll out new services. Store employees spend more time focusing on customers and accomplishing productive tasks, thanks to more reliable systems, better backup management and fewer local server problems.

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FROM THE EDITOR | JOHN DIX

Cisco's social Quad

What do you get when you cross aspects of social network tools with key business apps like calendar and real-time communications tools like VoIP, IM and video? According to Cisco, an online environment workers will live in all day long because it improves connectivity and productivity.

The company will flesh out more details of its Quad enterprise collaboration platform — pieces of which have been coming together for months — at the Enterprise 2.0 conference in Boston next week, but I got an in-depth demonstration last week and came away impressed. While many of Quad's capabilities are supported in products from other vendors, the seamless integration of Cisco's unified communications portfolio makes this compelling.

The Web-based Quad is at its heart a corporate social tool designed to efficiently connect workers in large organizations. Unlike consumer social tools, it has policy and security controls you would expect in a corporate setting.

When you log in you get a screen with a tabbed interface, the tabs being New post, My view, My profile, People, Community and Library. The three most important:

My view — the main landing page, which you can configure the way you want. As demonstrated, that page was dominated by a central panel dedicated to a watch list of people and projects the user was following, and the calendar was off to the right. At the push of a button you can call, IM or establish a video link to anyone who shows up in any of these panels, demonstrating the way Cisco has integrated real-time communications tools.

My profile — which represents the user's external face to the organization. It lets you list blog entries, outline areas of expertise, list work activities , post documents and even post meeting recordings— all things that should aid team formation in disparate corporations. It even lists alternative contacts and reporting structures.

Communities — designed to connect employees with similar interests. Three types are supported: Open, which everyone can see/join; Restricted, meaning you have to be asked to join; and Hidden, which are only known to people in the group.

Since it is Web based, you can get all of this, including the multimedia components, from any Internet-connected PC outfitted with a camera and a microphone, says Murali Sitaram, VP of Enterprise Collaboration. No client software is required.

The allure of the tool is evident when you see it in action. And it is also immediately clear that Cisco is on a collision course with Microsoft, IBM/Lotus, Google and others by pursuing this type of product. The good news for the buyer: a new wave of collaboration tools driven by the success of consumer social networking tools should be washing up on desktops soon.

John A. Dix

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PROTECTION
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peersay

Apple appeals to open-sourcers

THERE ARE THREE basic reasons why people like open source. Some people respond to all three, others to just one or two. They are 1) it rebels against the corporate world, 2) 'crowdsourcing' makes open source more robust, 3) it's free. (Why does the Open Source Community love Apple?; tinyurl.com/359v4lf)

Apple has been the platform of choice for years for the people rebelling against the corporate world. Apple was the first ready-built PC, when everything else was teletypes to minis or mainframes. Once IBM launched its PC, Apple was the underdog, first to Big Blue, and then to Microsoft. People who actually enjoy being sneered at by the corporate men bought Apple in the 1990s when analysts said the company was going under — and these were the same people who were busy embracing the open source revolution.

Because of the lack of support from many shrink-wrap software manufacturers, the Mac had a very healthy shareware and freeware community, partly aided by the fact that ResEdit enabled anyone to 'customize' the interface right up to OS 9.6.

Apple's embrace of Unix in the form of OS X opened the door to a raft of further shareware, freeware and open source applications, including X-windows applications. A lot of open-sourcers (but not all) complain about the closed iPad-iPhone-iTunes ecosystem, but one thing a lot of them really like is that so many of the iPxx apps are free, and Apple will give you the developer tools and the distribution method also for free.

Apple still has something for every kind of open-sourcer. For now.

Martin Turner

Pros and cons of Windows shopping

OUR PCS WORK just fine running XP. We see no reason to toss them out just to buy new hardware and "updated" software. (Time to start eliminating Windows XP, Gartner says; tinyurl.com/3y4psut)

The versions of MS-Office we have are just fine. Any new PCs we put OpenOffice on. With more apps becoming Web-based apps, the reasons for staying with XP are actually increasing, not decreasing. I'd rather spend our hard earned money on things that matter, not unnecessary upgrades that we don't need.

Anon

WE HAVE 10,000+ PCs in our organization and we recently moved to Win 7. I am personally pleased with the small footprint of Windows 7, excellent search capability and ease of shortcuts. Not sure how much our IT saved in infrastructure costs but it certainly enhanced everyone's productivity.

Anon

Comparing Apple and Microsoft ... or Apples and Oranges?

THE COMPARISION WOULD mean something if Microsoft manufactured phones or sold MP3s. (How Apple topped Microsoft; page 12) I suppose that Apple can still be considered a tech company. However, the vast majority of their tech seems geared more for the delivery of Apple content than anything else. As far as I can tell, the question isn't if Apple will cease production of its far less profitable line of computers and servers, but when.

Anon

I CAN'T BELIEVE you consider them in the same category. Apple's products are a handful of consumer grade toys compared to what Microsoft offers. Take a look at Microsoft's portfolio of enterprise products.

If I want to edit a photo or play music, Apple is my choice. For business, when I need a scalable highly reliable database, directory service, e-mail system, groupware, productivity suite or corporate desktop O/S, I go to Microsoft.

Anon

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bits

AT&T rethinks wireless data costs

WILL UNLIMITED WIRELESS data soon be a thing of the past? A&T this week is pulling the plug on its $30/month unlimited wireless data plan and replacing it with two plans that could lead to savings for some customers and higher charges for data hogs. Beginning June 7, AT&T will charge $15/month for up to 200MB of data (and $15 for another 200MB if you go over), or $25/month for up to 2GB ($10 for each GB beyond that). The company says 98% of its customers use less than 2GB per month, but some analyst firms say the average iPhone user consumes 250MB each month. AT&T also announced (hurray!!) that it will finally let users of some smartphone models, including the iPhone, tether devices such as laptops to get access to the Internet. Tethering will cost $20 more per month, but that's still less than the DataConnect cellular modems plans AT&T currently offers. Tethering for iPhone users will be available this summer when Apple releases iPhone OS 4.0. ***tinyurl.com/2es2hh8***

IE6 in death throes

THE END is nearing for Microsoft's 9-year-old Internet Explorer 6 browser. Nearly 11.5% of U.S. Web surfers were using IE6 just 12 months ago, but the browser is steadily losing share to newer versions of IE, Firefox and Google's Chrome. IE6's 4.74% U.S. share in May is down from 5.09% in April, according to research from StatCounter. With market share below 5%, developers will stop supporting IE6, forcing the remaining holdouts to switch to modern browsers, the firm says. ***tinyurl.com/2cyfyfa***

Android rootkit is just a phone call away

WHAT MIGHT the next generation of mobile malware look like? Possibly the malicious "rootkit" security researchers wrote for Google's Android phone to demonstrate next month at the Defcon hacking conference in Las Vegas. Once it's installed on an Android phone, the rootkit can be activated via a phone call or SMS message, giving attackers a stealthy and hard-to-detect tool for siphoning data from the phone or misdirecting the user. Because the rootkit runs as a module in Android's Linux kernel, it has the highest level of access to the Android phone and can be a powerful tool for attackers, even making it possible to track a victim's location. "Because we interface with the kernel, the opportunities to abuse this are limitless," said Christian Papathanasiou, a security consultant with Chicago's Trustwave, the company that did the research. ***tinyurl.com/26y3ahh***

Social networking big on mobile

MOBILE PHONES are becoming the device of choice for social networking. Mobile use of social net apps ballooned 240% to 14.5 million users in April compared to the same period last year, while the number of mobile visitors who used Web browsers to access social net sites grew 90% to 30 million in the same time period, comScore says. Other categories that saw strong demand from mobile users: news content (up 124% in application usage and 45% in browser-based site visits), sports information (113% application usage growth and 54% browser-based site visits) and online banking (almost double application usage and 69% browser-based site visits). ***tinyurl.com/27j7swp***

China flexes supercomputing muscle

CHINA'S NEBULAE supercomputer just snagged second place on the biannual Top500 list of the most powerful computers in the world. The new supercomputer, which was made by Dawning and installed at China's National Supercomputing Center in Shenzhen, combines Nvidia graphics processors and Intel Xeon CPUs to deliver 1.27 petaflops (a petaflop being a thousand trillion floating point operations per second). Still topping the list is the Jaguar supercomputer, a Cray XT5-HE system at the U.S. Department of Energy's Oak Ridge National Laboratory that delivers 1.76 petaflops. Twenty-four supercomputers on the list are now in China, tying the country with Germany at fourth place behind the United States, the United Kingdom and France. The United States maintained its dominance with 282 out of 500 supercomputers. ***tinyurl.com/24a23md***

Google App Engine chokes on demand

AREN'T CLOUD-BASED app dev platforms supposed to let developers focus on building applications rather than worrying about server problems? Two weeks after announcing a business version of its

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GOOD **BAD** **UGLY**

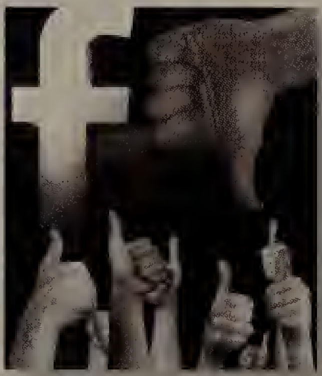
good

Toward cheaper clouds

THE ISLAND partly responsible for slashing the cost of personal computers has set its sights on the cloud, seeking to halve the price of the massive data centers required for the growing world of online services. Taiwan's publicly funded Industrial Technology Research Institute aims to create standards for building data centers inside 20-foot shipping containers, an idea popularized by Sun Microsystems in 2006 with its Project Blackbox.

bad

'Likejacking' exploit fools Facebook users and friends



HUNDREDS OF thousands of Facebook users were hit over the holiday weekend by a trick that spreads a clickjacking worm once the victim had been fooled into "liking" a page. Once that was done the action installed a Trojan and recommended the page to the victim's friends. According to security firm Sophos, which has taken to calling this type of exploit "likejacking," the viral "Like" worm spotted last weekend was working its way across Facebook with messages that include the following: "LOL This girl gets OWNED after a POLICE OFFICER reads her STATUS MESSAGE."

ugly

Google fed up with Android "fragmentation" claims

DAN MORRILL, open source and compatibility program Manager for Google, last week lashed out on the Android Developers blog at critics citing Android "fragmentation" as a possible limitation to the mobile platform's growth. "The thing is, nobody ever defined 'fragmentation' — or rather, everybody has a different definition. Some people use it to mean too many mobile operating systems; others to refer to optional APIs causing inconsistent platform implementations; still others use it to refer to 'locked down' devices, or even to the existence of multiple versions of the software at the same time. . . . Most of these definitions don't even have any impact on whether apps can run! Because it means everything, it actually means nothing, so the term is useless. . . . 'Fragmentation' is a bogeyman, a red herring, a story you tell to frighten junior developers. Yawn."

TRUE FACT

35 BILLION

Number of devices attached to the Internet. SOURCE: CISCO IBSG

Google App Engine application building and hosting service, Google acknowledges that performance of the product's datastore has been chronically deficient. The problems, which rippled out to other App Engine components, were caused by heavy demand, Google claims in a blog post. "There are a lot of different reasons for the problems over the last few weeks, but at the root of all of them is ultimately growing pains. Our service has grown 25% every two months for the past six months." Google is scrambling to bolster the service infrastructure, but performance is expected to remain rocky for the next two weeks. To make up for the recent string of outages, slowdowns and errors, Google is waiving datastore CPU costs retroactively effective to the May 31 bill and until further notice. ***tinyurl.com/298nqmu***

I don't know, but I like it

MOST U.S. residents don't know how fast their home broadband service is supposed to be, but they're satisfied with the speed they get, the FCC reported after conducting a nationwide phone survey. Overall, 91% of broadband users said they were either "very satisfied" or "somewhat satisfied" with their home broadband speed. However, 80% of the 3,005 respondents did not know the advertised speed of their service. The survey, which asked about both home and mobile broadband, is one step in an ongoing FCC plan to determine broadband speeds and help consumers choose the right service for their needs.. ***tinyurl.com/28um2ny***

Want to talk? Pedal

MAYBE NOKIA has found a way to address the obesity problem ... a way users can charge their cell phones while cycling. The kit has a dynamo that uses the movement of the wheels to charge a handset in a holder through a standard 2 millimeter jack. To reach the same efficiency as a standard AC charger the cyclist has to pedal 7.5 miles per hour. The charger kit will be available before the end of the year and is expected to cost about $18. ***tinyurl.com/2ev2rue***

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How Apple topped Microsoft

BY JON BRODKIN

IN THE past decade, Microsoft has acquired nearly 10 times as many companies as Apple, and spent nearly nine times as many dollars on research and development.

Yet Microsoft's stock price performance has stagnated these last 10 years, while Apple has soared to its current status as the world's most valuable tech firm, a title wrenched away from Microsoft just last week.

Dow Jones investment banker Sameer Bhatia says Apple has succeeded where Microsoft has not by focusing obsessively on user-friendliness. While Microsoft trots out new versions of Windows, Apple has found new tech markets to dominate by creating the iPod, iPhone and iPad, he notes.

Based on willingness to spend money, it would seem that Microsoft should be the more innovative company of the two. Microsoft made 104 acquisitions compared with Apple's 11 in the past decade, while spending $71 billion on research and development, compared with Apple's $8 billion. Dow Jones compiled these numbers from the Capital IQ database.

But buying new companies and pouring money into R&D is not the same thing as innovating, Bhatia said. "If a company focuses on the user needs and user interaction, that's more important than having loads of cash and capital, and doing mergers and acquisitions."

Apple's secret is not making huge investments to keep up with competitors, but in "identifying and satisfying unmet customer needs," Bhatia wrote in his blog. As a result, Apple's stock price has risen 10-fold in the last decade, he writes.

It was May 26 when Apple topped Microsoft with a market cap of $223 billion, higher than Microsoft's market cap of $219.3 billion.

Few tech companies are even close to these titans when it comes to market cap. According to the *Financial Times'* most recent Global 500 report, released March 31, IBM's market value was $167 billion, AT&T was $153 billion, Cisco checked in at $149 billion and Google at $139 billion.

Apple's decade-long rise to the top of the tech world was boosted most recently by the sale of 2 million iPads in just 60 days.

Being the most valuable tech company in the world isn't necessarily a good thing, Bhatia said. "The risk is greater to Apple, frankly," he said. "Once the hubris starts catching up to management is when the downfall happens. From an end user perspective, it's irrelevant."

SPENDING INEQUALITY

Microsoft made 104 acquisitions and spent **$71 billion** on R&D in the last decade, while Apple bought 11 companies and pumped **$8 billion** in R&D.

But if Apple continues its current momentum it will be difficult for Microsoft to catch up, he said.

Microsoft has long dominated the tech market because of its success in creating software for the workplace. "Business users were the first ones to get computers," and their familiarity with Windows led to success in the home PC market as well, Bhatia said.

But Apple has lured consumers with intuitive, easy-to-use products, such as Macs and iPhones, and now consumers are bringing those devices into the workplace. While "most tech companies are focused on how many features you can pack into a device," Apple executives seem to be proud of the features their products lack, Bhatia said.

Apple executives took their time in delivering multi-tasking to the iPhone, saying they didn't want to sacrifice battery life.

Apple's approach to using the Web on iPhones and iPads has been compared by some to AOL's failed "walled garden," which isolated users from much of the Internet.

But Apple's closed systems have proven to be relatively secure, and so far iPhone and iPad users enjoy using their "apps," rather than a Web browser, to check weather, directions and other information, Bhatia said.

When it comes to the Mac, the proliferation of Web services plays right into Apple's hands. Many home users are switching to Macs and pushing IT departments to adapt. Switching from Windows to a Mac in the corporate setting can be quite difficult, because various software applications, middleware, ERP systems and so forth are compatible only with Windows.

But the proliferation of cloud computing is putting more business services onto the browser, rather than in the data center, making it easier for businesses to let users choose their own devices, Bhatia says.

In general, Apple has succeeded not by inventing entirely new technologies but taking available technologies and packaging them in a way that's useful to consumers. ■

Gartner: Time to eliminate Windows XP

BY JON BRODKIN

MOST ORGANIZATIONS should start drawing up plans to eliminate Windows XP and shift workers to Windows 7, Gartner is advising.

About 80% of Gartner clients skipped Windows Vista, and are relying mainly on the aging XP, the research firm says.

Windows 8 is "nowhere in sight," so "most organizations should be planning and testing Windows 7 this year," Gartner says.

Microsoft has pledged to support XP until April 2014, seemingly giving businesses a long lead time to migrate to a newer operating system. However, by 2012 the new versions of many applications will not support XP, and various independent software vendors will start eliminating XP support, Gartner says.

Planning, testing and piloting a new operating system takes 12 to 18 months for most companies, so businesses should start testing Windows 7 this year.

"Most organizations should try to eliminate Windows XP by the end of 2012," Gartner says.

One-quarter of respondents to a CDW customer survey earlier this year were already planning to move to Windows 7 within 12 months. But half of the 618 respondents had no plans to migrate and some said they would wait until Microsoft no longer supports their current operating system before switching.

Still, the early signs for Windows 7 are better than for Windows Vista, which was widely panned by customers.

Microsoft CEO Steve Ballmer admitted that Vista "was just not executed well," but seems optimistic about Windows 7.

Home users are already moving off of XP, and if businesses don't do the same "most people will ask their boss why the heck they don't have the stuff they have at home," Ballmer said more than a year ago. ■

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Cyberattacks seen as top threat to zap grid

BY ELLEN MESSMER

CYBER ATTACKS, pandemics and electromagnetic disturbances are the three top "high impact" risks to the U.S. and Canadian power-generation grids, according to a report from the North American Electric Reliability Corp. (NERC).

"The concern with these threats is the targeting of multiple key nodes in the system, if damaged, destroyed or interrupted in a coordinated fashion, could bring the system outside the protection provided by traditional planning and operating criteria," states the report.

The report is largely the result of closed-door discussions held since November by NERC, power providers and U.S. government officials.

The report, which calls for better coordination between U.S. power-grid providers and the government, sets the stage for what may be new guidelines and processes required to combat major threats, NERC officials say.

The threat of a coordinated cyber attack, which might be combined with a physical attack, is considered the first of the top three "high-impact, low-frequency" threats to North American electricity supply, according to the report.

The electric power grid, on a daily basis, endures "hundreds of thousands of probes," said Gerry Cauley, president and CEO of NERC. He noted there has been "suspicious activity around control systems."

But NERC officials declined to confirm or deny past reports that spies have compromised the U.S. power grid with malicious code that would allow intruders to damage or interfere with safe operation of the grid.

However, the report does say "an intelligent attacker" could "mount an adaptive attack that would manipulate assets," and possibly "provide misleading information to system operators attempting to address the issue."

The report suggests few details about possible defensive plans, except that there should be better "forensics tools and network architecture to support graceful degradation," with an "eye toward designing for survivability."

Mark Lauby, director of reliability assessments at NERC, said the outfit is looking at "creating specific mitigation measures" and possible new standards to strengthen the power grid and its operation. Though NERC sources say there's no specific timeframe for doing so.

The report provides few clear answers on how to combat any of the three named threats, including electromagnetic disturbance (said to originate in violent solar activity, or possibly "detonation of a large nuclear device," or some kind of intentional electromagnetic interference that might target local power-grid elements).

In fact, the report points to some dismaying weaknesses in the U.S. power grid, such as components being manufactured overseas, with little manufacturing capability in North America, the report states.

NERC does plan to identify "mitigation steps" to address these top risks, noting that any effective response will require close communication with federal agencies.

But the tone of the report is not highly optimistic.

"The first step," the report says, is "acknowledgement that fully protecting the system from a coordinated attack is not possible," noting "the bulk power system is literally comprised of hundreds of thousands of miles of high-voltage transmission lines." Any defense is going to require "a strong mix of preventative measures built on the inherent resiliency of the system and preparatory measures that will enable system operators to recognize an attack and respond to it when it does occur."

"The electric utilities have done very, very little to secure their power plants, substations and control centers," says Joe Weiss, managing partner at engineering consultancy Applied Control Solutions, who contributed to the NERC report. Weiss says the NERC report is intended to "try and wake the utilities up," and will most likely lead to greater regulation for them in terms of cybersecurity.

"The standards out there for the electric-power industry are incredibly weak," Weiss says, noting the report is looking at the possibility of events occurring that would "bring the power grid down for months."

One idea put forward in the NERC report, having a security manager in power-plant environments who would be the main contact with a government liaison to communicate on serious security issues, is something Weiss said he would favor.

Weiss said he's skeptical about this notion that somehow malicious code planted by spies has compromised electric-power plant control systems but he adds, "We have done very little forensics to even be able to know." ■

In an online-only package, the Network World staff has assembled a series of primers examining the past, present and futures of 20 of the most prominent battles in the technology world. Here's a sample of the subjects and you can read it all at: **tinyurl.com/2fgcy9y**

Cisco vs. Juniper
Rivals taking router face-off to the data center.

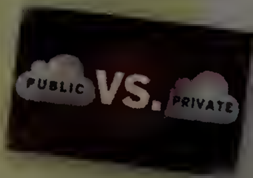
AT&T vs. Verizon:
The top two carriers battle for a market that's still fast-evolving.

Google vs. Bing vs Yahoo
Google dominates search, but Yahoo and Microsoft are giving chase

VMware vs. Microsoft vs. Citrix
Server virtualization no longer a one-horse race.

Desktop virtualization vs. PCs
Virtualization cuts energy costs and boosts security, but ROI elusive.

Public vs. private cloud
Will enterprises favor shared or exclusive Internet services.



McAfee vs. Symantec
The "Hatfields and McCoys" of anti-virus have kept their feud alive for decades.

Firefox vs. Chrome vs IE
Browser battle migrates from desktops to smartphones.

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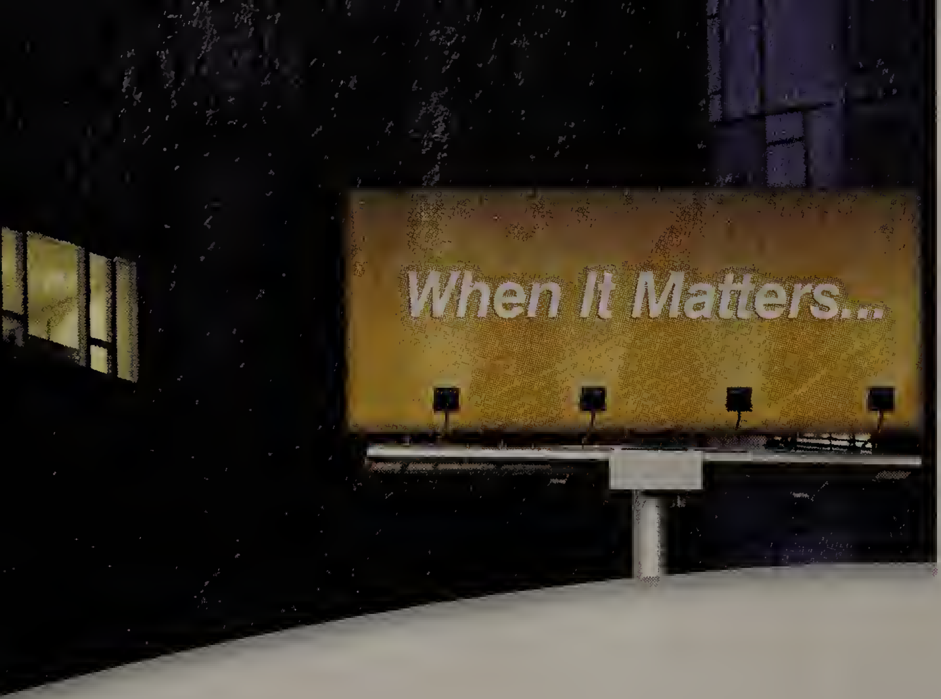

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Google is no competitor for Skype — yet

BY TIM GREENE

GOOGLE'S RECENT purchase of codec innovator Global IP Solutions has observers in a froth over a possible showdown between Google Voice service and Skype, the most popular and largely free VoIP service that includes video and conferencing. But Skype shouldn't worry in the short term.

The truth may simply be that Google is promoting technologies that advance its real interest — making it simpler for people to use the Internet more. "They sell content," says Diane Myers, an analyst with Infonetics. "They want to enable their content on multiple platforms, especially mobile."

While the company has assembled an impressive array of full-blown and trial services that encourage Internet use, it hasn't assembled a coherent service along the lines of Skype's peer-to-peer voice and video services that interface with traditional switched public phone networks, including wireless.

Google's forays into support for various modes of communication include its open source Android mobile operating system that encourages texting, Web browsing, use of still and video cameras, and independent application development. It also has its fingers in e-mail with its free Gmail service, collaboration with Wave and even broadband-over-fiber services with a plan to deliver gigabit services to limited markets.

The purchase of GIPS adds very well-respected audio and video codecs that encode those traffic types for IP networks, accommodating for delay, jitter and low bandwidth. But that in itself doesn't mean that Google is ready to compete directly against voice service providers, Myers says. "GIPS is a technology provider to help rich media on the back end," she says.

GIPS has an impressive array of customers — including Cisco, Yahoo, America Online, IBM/Lotus – that use its technology in their voice or conferencing services. But GIPS technology is a component in broader services, according to another of GIPS's customers, Germany-based Goober Networks, which provides VoIP, videoconferencing, chat and collaboration services.

"I don't see Google as a competitor," says Peter Uhlich, Goober's CEO. "The real competitor in VoIP is Skype." In fact, Uhlich says he sees Google more as a potential partner that could wrap Goober's services around its existing offerings.

Combining Goober's services with Google's market clout and financial resources could turn Google into a viable Skype competitor, he says.

Still, with Google's deep pockets and its propensity to stir up markets as it did by using its influence to ensure open access to wireless spectrum sold in 2008 by the Federal Communications Commission, the company might well decide it needs to develop its own voice and video services, says Tom Nolle, president of CIMI Corp.

"Given all Google's announcements in the voice arena already, it seems likely that they plan to either enter the VoIP market to compete with Skype or at least to provide their own voice collaboration tools and services, competing with some of the Web conference players like Cisco (WebEx) and Citrix (GoToMeeting)," Nolle says in a blog.

Because of Google's financial might, it could at the very least influence what services established carriers come up with as they formulate their strategies, he says. ■

NETINSIDER | BY SCOTT BRADNER

Can Facebook privacy be simple?

FACEBOOK, ACCORDING to its CEO, is built around the simple idea that people want to share things with "their friends and the people around them."

At first it was sharing with your list of friends and others (including non-friends) at your location, which was your school. So, from the beginning, your default sharing included people you did not know and had not listed as people you wanted to share information with.

Seven years later that is still the case, and Facebook's business plan seems to depend on you being willing to share with strangers.

Facebook's default sharing profile has changed over the years. The scope of who gets to see information about you if you do not exercise any control has grown significantly as has, until very recently, the complexity of what you had to do to rein in the scope.

After months of relentless bad publicity about its privacy assumptions and controls, Facebook has heard a message — maybe not "the" message, but at least "a" message. The social networking site has significantly simplified its privacy controls, but its recommended, and I assume, default setting is very broad. Facebook still wants the world to know you, and part of that world includes Facebook applications and partner Web sites. The latter function is benignly called "instant personalization." Facebook has now added a way to configure what information instant personalization will hand off about you.

I first got my Facebook account in March 2004, just about the time that Facebook expanded from being just Harvard to include Stanford, Columbia and Yale, because my boss wanted me to see if Facebook's privacy seemed OK. As Harvard's CIO, he was curious, even though Facebook was not a university effort. I did some poking around and remember talking with Facebook co-founder Mark Zuckerberg on the phone or via e-mail. Things seemed fine to me.

But, when I was asked for my birthday as part of the registration process I did not see a reason that Facebook needed this information, so I made one up.

I quickly forgot about this made-up birth date, but recently it did come back to get in the way. I did wonder about the birthday greetings I received on the wrong day from people I did not know all that well but dismissed it as flukes. Earlier this year I signed in to Facebook from Toronto when I was there on a business trip. Facebook would not let me log in because I was not at my normal location. I suppose that is a reasonable anti-hacking feature but I was blocked when Facebook asked me to verify myself because it asked for my birth date as part of the verification process. So I was stuck. I tried and failed to raise a human through Facebook's online help process. It was a few weeks later that I figured out that I could tell Facebook that I forgot my password and get a new password e-mailed to me.

Facebook let me log in once using the new password. That gave me a chance to find out what birth date I had used (it does not seem possible to change it even if I wanted to), so when I was challenged the next time I tried to log in I was able to verify myself. Such a relief.

The new Facebook privacy configurations are a big improvement over what went before, but they are still missing a major concept: not all friends should be equal in terms of sharing. Friends are not equal in the real world — there are many things that you tell some friends and not others. Adding this bit of real-world reality would not make things simpler and it would run counter to Facebook's expansive picture of sharing, so I doubt it will happen.

Disclaimer: Harvard tries to prepare students for a real world, maybe one that they help make (as Mark did). But the above review and story is mine and not the university's. ■

Bradner is Harvard University's technology security officer. He can be reached at sob@sobco.com.

Red Hat looks to make data transition smoother

BY MIKAEL RICKNÄS, IDG NEWS SERVICE

CLOUDS CAN become the mother of all lock-ins, warns Red Hat's CEO James Whitehurst.

Once users get stuck in something, it's hard for them to move, Whitehurst says. The industry has to get in front of the cloud wave and make sure this next generation infrastructure is defined in a way that's friendly to customers, rather than to IT vendors, he says.

Lock-in comes in many different guises, including the inability to move workloads among different clouds, the difficulty of extracting data from the cloud and being forced to use the underlying virtualization platform chosen by the cloud provider.

Red Hat is focusing much of its efforts on the first of these potential issues. Certifying cloud partners is the most important thing Red Hat has been working on this year, Whitehurst says. Making sure workloads are mobile in the new cloud-based environment is critical, he says, and that is what Red Hat's Premier Cloud Provider Program is about.

"Our customers can run the workload in their data center or migrate it to multiple cloud providers . . . and we'll support you on it and your [independent software vendors] will support you on it," he says.

The cloud certification program was announced last year, and Amazon Web Services was the first cloud provider to get certified. Since then, NTT and IBM have been added to the list of certified partners and more are on the way, Whitehurst says.

For a cloud provider to be certified it has to use a virtualization platform based on VMware's ESX hypervisor, Microsoft's Hyper-V or Red Hat's own hypervisor, which is based on Kernel-based Virtual Machine.

To be able to move a workload from a data center to a cloud or between two clouds, a connecting API is needed, and there are a plethora of different ones being developed. Fewer would be better, Whitehurst says. However, the real challenge isn't the API, but ensuring that the application will run with the same performance when it has been moved. That is what Red Hat is focusing on. Getting an API in place that allows a workload to be moved is only 10% of the work, he says.

Red Hat CEO James Whitehurst

The next step is also being able to move licenses along with the workloads, Whitehurst says. In April, Red Hat announced Cloud Access, which will let enterprises use their subscriptions to support either traditional on-premise servers or servers hosted on Amazon's Elastic Compute Cloud.

Red Hat isn't the only company that wants to make it possible for companies to move their workloads among data centers and clouds. For example, VMware is developing the vCloud Service Director, previously code named Project Redwood. However, the tool is still being beta tested, and the plan is to ship it before year-end, according to Richard Garsthagen, senior evangelist at VMware in Europe, the Middle East and Africa. ■

Redefining X.

When an organization needs more computing power for today's memory-intensive workloads, the conventional wisdom is to buy more servers. This can lead to massive inefficiency and server sprawl, with the majority of servers today running at only 10% utilization.[1] As the computational demands of a smarter planet continue to explode, this sort of inefficiency has become a problem—a problem IBM engineers have now solved. The 5th generation of Enterprise X-Architecture® from IBM featuring the Intel® Xeon® Processor 7500 Series lets you add memory independently of the processor. As a result, IBM eX5 systems can leverage 6x more memory than current x86 servers, reduce storage costs by up to 97% and cut licensing fees by 50%.[2]

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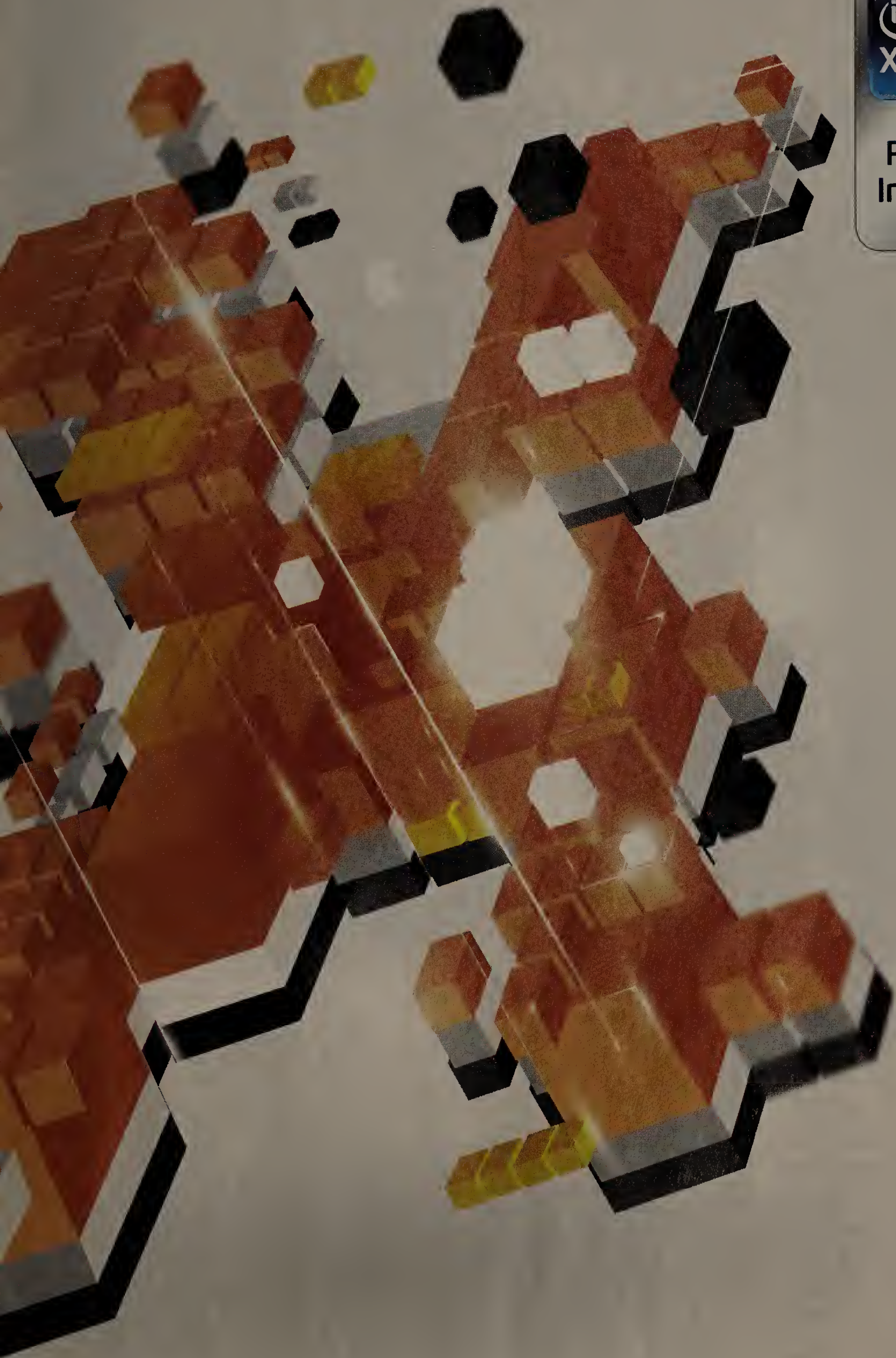

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1. McKinsey study: http://www.datacenterknowledge.com/archives/2009/04/15/mckinsey-data-centers-cheaper-than-cloud/. 2. Comparison of IBM System x3850 X5 + MAX5 with total 96 DIMMs x 16 GB for total 1.5 TB of memory vs. IBM System x3850 M2 with 32 DIMMs x 8 GB = 256 GB. Comparison of processor-based licensing fees on current Generation 4 processor systems with 64 DIMMs vs. the IBM System x3690 + MAX5. IBM eXFlash technology would eliminate the need for a client to purchase two entry-level servers and 80 JBODs to support a 240,000 IOPs database environment, saving up to 97% in server and storage acquisition costs. IBM, the IBM logo, ibm.com, X-Architecture, Smarter Planet and the planet icon are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. A current list of IBM trademarks is available on the Web at www.ibm.com/legal/copytrade.shtml. Intel, the Intel logo, Xeon and Xeon Inside are trademarks or registered trademarks of Intel Corporation in the United States and other countries. © International Business Machines Corporation 2010.

Six misconceptions about cloud apps

BY JON BRODKIN

CLOUD COMPUTING is all the rage in the IT industry these days, but there's still confusion about how cloud applications work and what kind of long-term impact they will have on business technology.

We look at six common misconceptions IT pros and users have about cloud apps, related to performance, security, management, cost and the long-term effect on IT staffing.

1. Cloud computing will put IT pros out of a job

It's true that shifting internal IT functions to cloud applications lessens the need for a business to have a huge IT staff. Some organizations have moved to cloud services such as Google Apps because they no longer had the staff to handle an internal e-mail and collaboration system. This cause-and-effect may be switched in other cases, with layoffs occurring because of a move to outsourcing.

But the long-term risk to IT employees may not be as terrible as it might first appear, analysts say. For a business that uses many cloud apps, internal IT staff is still needed to manage and integrate the services.

"There's no question it could reduce the demand for traditional IT skills," says analyst Jeff Kaplan, managing director of Thinkstrategies. "But that doesn't mean there can't be a whole new generation of requirements around vendor management, to properly evaluate, select, monitor, manage and contract with these cloud computing companies."

2. The cloud is free (or at least incredibly inexpensive)

The Google Apps business version is $50 per user per year. Microsoft's online services start at $120 per year, and both Google and Microsoft offer free versions to home users. That sounds inexpensive, because it is, but users and analysts are quick to point out that licensing is not the only cost of using a cloud service.

"One of the biggest preconceived notions you have is that it's free. It's out there, it's not a big deal, just sign up and everything's great," says Scott Weidig, who is a technology coordinator at Schaumberg High School in Illinois and uses a variety of cloud apps for business and personal use,.

Some customers report having to upgrade Internet bandwidth to take advantage of cloud services. There are also hidden legal costs, because there is generally an increased risk profile when you move applications from the enterprise data center to the cloud, says Nolan Goldberg, an attorney for Proskauer Rose LLP in New York.

3. Cloud performance is never a problem

Just because you use a cloud provider doesn't mean you can ignore your own IT infrastructure and expect great performance. Information systems director Timothy Porter says after adopting some cloud apps a few years ago, "we had to reevaluate the amount of bandwidth we had in our corporate office."

Porter is the IS director at WS Development Associates in Chestnut Hill, Mass., a real estate developer and owner with 82 properties throughout New England.

WS Development Associates uses cloud software applications for invoice processing, payroll and other HR functions. The company originally had two T-1 lines, and upgraded to a Verizon Mux setup for data rates of up to 50Mbps. Cisco WAN acceleration devices were also necessary to improve performance at branch offices, Porter says.

Even if your Internet bandwidth is solid, other factors can degrade performance. At Schaumberg High School, Weidig says a Web filter installed to prevent students from surfing inappropriate sites was slowing legitimate educational Web sites. Reconfiguring the server to more efficiently allow access to trusted sites solved the problem, but identifying the issue was not a simple task.

4. You can replace Microsoft Office with Google, or Zoho, or...

Yes, there are examples of organizations switching completely from Microsoft Office to a cloud-based e-mail, document editing and collaboration platform, but it is definitely the exception for now.

An IDC survey in July 2009 found that nearly 97% were using Microsoft Office, and 77% were using Microsoft to the exclusion of all other platforms. Google Docs was being used extensively by nearly 20% of businesses, but mainly as a complement to Microsoft Office rather than as a replacement.

Even the most optimistic cloud computing proponents usually won't claim that cloud apps are as good as Microsoft Office. Raju Vegesna, the evangelist for cloud apps provider Zoho, says that while the cloud will eventually be a viable replacement of Microsoft, "in the short run it's complementary."

"Microsoft took 20 years to build Office to where it is. It just takes time. There are features we will have to implement to have the depth of Microsoft Office," Vegesna says.

5. The cloud is easy to set up and manage

Vendors may tell you that using cloud applications will nearly eliminate IT management needs, but customers say managing cloud services is not that simple.

There are still management responsibilities in terms of managing the service providers you contract with, Kaplan notes.

IT management also extends to integrating tools from multiple vendors, and provisioning new cloud services in response to user needs, Vegesna says. Ensuring performance of applications may require upgrades to a customer's infrastructure. Another consideration is making sure you have control over your data, an important task for both practical and legal reasons. The ability to move data and business processes from one cloud service to another may be limited.

Users experienced with using Gmail or Google Docs may not realize how complicated setting up a cloud service for a corporation is, Weidig says. "From a consumer standpoint, it's very easy to set up," he says. "From a corporation's standpoint, that becomes a much larger uphill battle."

6. Security is [fill in the blank]

Security is a contentious issue for cloud watchers. Some argue that users mistakenly believe clouds are inherently insecure, while others say users are not skeptical enough.

Vegesna argues that most customers will have more security by moving to Zoho, because "we have larger security teams than most of these businesses," and Zoho hires third-party white hat hackers to test its systems monthly.

Weidig, however, says that while he generally trusts vendors like Google, Zoho and Microsoft, he thinks users place too much trust in the data security of cloud providers.

Kaplan is on the side of cloud vendors in this case.

"A lot of people think inherent to the Web there's far less security, but in many cases it could be far greater," he says. "When you talk about proven players, like Salesforce and Google, they are facing far greater security challenges and holding up against those in a far better fashion than many corporations." ■

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▶ **TechEd,** *from page 1*

specification and beta versions of the operating system itself.

Cloud forecasts

There are any number of cloud topics Microsoft could address at TechEd, from its struggle to wrench momentum away from Google Apps, to security of the cloud, and licensing the use of Windows in cloud services. But Microsoft's strategy around Azure seems to be less well defined than its other cloud ventures, and therefore may receive a bigger focus at TechEd, analysts say.

"I expect them to make a major move" regarding Azure, says Burton Group analyst Drue Reeves, who believes Microsoft has to walk a fine line with Azure, which delivers a cloud-based operating system, relational database and several other services.

Azure potentially poses a conflict of interest for Microsoft, Reeves says. Microsoft wants partners to use the Hyper-V virtualization technology and .Net software framework to build cloud services, but the market presence of Azure might dissuade cloud providers from using those Microsoft technologies, he says.

"If you're a new provider, are you going to use Hyper-V, or are you going to use .Net and offer that as a service and compete with Azure? Not likely," Reeves says. Microsoft is "providing the enabling technologies for cloud providers and selling against them at the same time."

Azure exited beta and went into general availability on Feb. 1 of this year. But Microsoft has been relatively quiet overall about the cloud service. "I have a list of questions to ask [Microsoft] about Azure," says Pund-IT analyst Charles King.

In addition to the cloud-based operating system and SQL database, Azure includes a content delivery network. King says he wants to know what other Azure services will be rolled out, and what kind of interest Azure is receiving from customers so far. While most big IT vendors are focusing on enterprises and service providers, King says Microsoft may be ideally positioned to market its cloud service to small and midsize businesses.

"Microsoft is the de-facto vendor of choice for most small businesses," King says. "I think small- and medium-sized businesses are in a position to really gain some interesting benefits from the cloud."

Reeves says Azure seems to be in flux, with Microsoft still "trying to figure out whether it's platform-as-a-service or infrastructure-as-a-service."

Cloud platforms allow developers to build and deploy Web applications without any internal hardware and software, while infrastructure services deliver raw computing and storage capacity to customers.

TechEd 2010

With a heavy focus on cloud computing, Microsoft's annual event for IT pros and developers takes place June 7-10 in New Orleans.

- **Not going? No problem:** Microsoft will stream keynotes live and broadcast interviews online at www.msteched.com/online/home.aspx
- **TechEd is also on Twitter:** http://twitter.com/TechEd_NA
- **And Facebook:** www.facebook.com/teched
- For the 6,000 attendees who will be on-site, TechEd will feature more than 1,000 sessions on Microsoft technology.

Microsoft still needs to show that Azure has real, live customers, define proper use cases and say "'this is what it's good for so they can position themselves in the market," Reeves says. In competing against Amazon, "It's not a question of technology. It's a question of their business model," he says.

A Microsoft spokesperson says the TechEd event "will focus on the cloud strategy for enterprise customers and developers," without revealing other details. With a topic as broad as cloud computing, that leaves open the possibility of several areas Microsoft may choose to focus on.

For example, Azure Senior Architect Hasan Alkhatib said last December that Microsoft was working on a new security structure for multi-tenant cloud environments, and private cloud software based on the same technology used in Azure.

Or, Microsoft could discuss its vision for using its System Center Virtual Machine Manager, Hyper-V and Windows Server together as the infrastructure for building private clouds, as well as how customers can create hybrid clouds that allow workloads to shift from internal data centers to external, Windows-based cloud services.

Microsoft's cloud strategy wouldn't be complete without a revamp of its licensing policies. Reeves says Microsoft has done a good job with its service provider licenses, which, for example, let customers run Windows and SQL Server on the Amazon cloud. But Microsoft has more work to do with service providers to ensure that customers feel comfortable running Windows in numerous types of cloud services, Reeves says.

Meanwhile, back on the mobile front, experienced Windows application developers have had high praise for the radically redesigned user interface in Windows Phone 7, which was unveiled in February. But without actual handsets, they have had to rely on the PC-based Windows Phone emulator to experiment with the look and feel of their mobile applications.

In addition to real Windows Phone 7 handsets and beta versions of the operating system, developers are hoping TechEd yields more details about the online Windows Phone 7 Marketplace and the process of submitting and approving applications. They would also like more information about enterprise-specific features, functions and APIs, and to learn specific target dates for new HTC and LG handsets running Windows Phone 7.

The more of these expectations that Microsoft can meet, the more it can prove that it has a mobile strategy that's being executed effectively. A growing number of experienced Windows developers are committing to the Windows Phone platform, provided Microsoft delivers on its initial promises.

So far, Kevin Hoffman has been impressed with the ease of developing sophisticated mobile apps.

"As I've been spending more time writing iPhone apps for clients and Windows Phone apps for my own education, the gap between how much easier it is to get something done on Windows Phone vs. iPhone is widening," says Hoffman, who is chief systems architect with Oak Leaf Waste Management in East Hartford, Conn., and a Windows and iPhone development blogger and author.

Building a stock iPhone app is very easy, Hoffman says. But to customize it is a laborious process. Silverlight makes complex customization in Windows Phone 7 a snap.

It's an eye-opener for developers who struggled in the past with Windows Mobile development, where creating the user interface could be "incredibly tedious," says Doug Boling, principal of Boling Consulting, Saratogo, Calif. "It's incredibly liberating for developers not to have to do this," he says. "With Silverlight, it's vastly easier to program for Windows Phone than it is to program for the iPhone."

Although developers are impressed with the quality of the code, there's some uncertainty due to its relative immaturity. The OS currently is what Microsoft calls a Community Developer Preview, not even beta code. ■

▸ **WAN,** *from page 1*

but nothing that would appease disgruntled users. Typical Word and Excel response times dropped from 30 seconds to 20 seconds, but that was still too long. "[Users] didn't perceive it as being any faster. The problem was that they weren't getting LAN-performance speed," Shisko says

Performance gains among U.S. sites weren't significant enough to warrant buying the gear. But the company installed it between its data center in Dallas and European offices and cut down response times on key applications from several minutes to several seconds.

Keeping an eye on the business goal of improving performance so users would notice, the company bought Blue Coat optimization gear just for the international sites. Hitachi Consulting already used Blue Coat's traffic monitoring/shaping gear, PacketShaper. "The Blue Coat strategy included tight integration with PacketShaper. Just raw acceleration was not the goal but intelligent acceleration was," he says.

The goal was different for Booz & Co., which was centralizing branch servers to reduce capital and operational costs, says Ted Theofanos, senior manager of IT infrastructure.

The company tested several vendors' gear – Theofanos wouldn't say which ones – but liked Cisco's WAN optimization gear WAAS because it tunneled traffic in separate TCP sessions, enabling more detailed monitoring of traffic over the WAN. It was also integrated with Cisco's Netflow system that gathers further traffic information that can identify users as well as applications that are blocking more important traffic.

The gear reduced traffic between 20% and 40% of the volume it took up before optimization, and the result is that the company hasn't had to expand bandwidth on its MPLS network as fast as it would have without the technology, he says.

Similarly, Columbian Chemicals of Marietta, Ga., was doing server consolidation, says Eric Mermelstein, the company's enterprise infrastructure architect. After testing boxes from Cisco, Expand Networks and Riverbed, the company decided on Riverbed. The gear is now installed at 18 sites over a meshed MPLS WAN from Verizon, allowing the elimination of 14 local servers and their associated costs.

Active directory servers still reside in branches on virtual machines in the Riverbed boxes themselves via a feature called Riverbed Services Platform (RSP) – disk space that supports VMware virtual machines. That keeps down the amount of hardware needed.

Beyond meeting the server-consolidation business driver, WAN optimization boosted application performance by reducing congestion, Mermelstein says. At sites that were running at 100% capacity during business hours, WAN utilization has dropped to an average between 50% and 60%, he says. The firm is rolling out VoIP as well and needs some bandwidth headroom so that call quality isn't affected by data traffic, so the reduced WAN traffic helps.

The company has also changed its disaster-recovery strategy and it now replicates about 600GB of data per night between its main data center in Arkansas and the disaster-recovery data center in Georgia. Without WAN optimization, that would have taken 48 hours, he says.

Improving the disaster-recovery was the key business driver for Texon, a firm that specializes in the transportation of crude oil and tracking how much is coming in and going out, says Sean Brown, senior network administrator for the firm.

The company wanted to speed up data replication between its data center in Houston and disaster recovery in the Conrow, Texas, site about 100 miles away. "They were slower than what we really wanted," he says. With a 6Mbps dedicated link between the sites it took four days to replicate 40GB of data, he says. "We wanted more out of it, basically," he says.

Before it started using optimization software from Certeon, the company could deal adequately with the threat of hurricanes, which come with days of advanced warning. Now it can deal with all emergencies, even those that come by surprise. "We are as real-time as we can be in this situation," Brown says.

With the Certeon aCelera software in place, replication is run every day and completed in about eight hours. Some data is replicated even more often, which means there is less time for massive amounts of data to build up so the volume per day is cut in half to 20GB.

Exchange is replicated 10 to 12 times per day, just about every hour during business hours. Most of the business relies on SQL data, which is replicated every 15 minutes, meaning that in a disaster, the worst case is that only the last 15 minutes of the most critical data will be missing. "To us, that's the most important aspect of our business," Brown says.

These WAN optimization customers have a range of advice for implementing WAN optimization systems:

- When testing in your own environment, use a range of sites to get data that is representative of varying conditions.
- Analyze your network traffic first to figure out what WAN performance each type of traffic requires.
- Minimize encrypted traffic because it cannot be optimized as well as unencrypted traffic.
- Check out vendor best-case performance claims in your environment. ■

WAN optimization check list

Here are 10 questions that anyone planning on using WAN optimization gear should ask during tests of individual products, according to the Burton Group report "WAN Performance Optimization: Selection and Integration." Potential customers should ask: Does the gear . . .

Compress? Cache?

Create/preserve QoS tags and filter based on blacklists and whitelists?

Optimize both TCP and UDP?

Optimize Web traffic with improved caching, delta compression, read ahead and special handling of AJAX and XML?

Accelerate CIFS and NFS, and can it shift to local caches if the WAN fails?

Perform specialized acceleration for common applications such as Exchange, SharePoint, MS-SQL, EMC Documentum and Solid Edge CAD?

Accelerate isolated users' machines?

Work with the network routing and security architectures?

Produce performance and diagnostic information?

Act as a branch-in-a-box by supporting other functions?

TOOLS

Faulty firewalls and damaged DNS

Well, my tribulations with the Netgear eight-port Gigabit ProSafe VPN Firewall (model FVS318G) I discussed in the last installment of Gearhead appear to have been caused by faulty hardware.

Mark Gibbs' Gearhead

To recap: I purchased one of these devices for my network and during the first few days of use my FVS318G randomly turned into a brick with pretty flashing lights that made it look like it was working when, in fact, it was not.

Several readers reported problems with the same or related Netgear hardware but nothing that quite matched my experiences. The nice chaps at Netgear offered to troubleshoot the problem but I was unwilling to keep a device that was problematic. So after I returned my unit Netgear sent me an identical unit to test.

I should really say "almost identical" because unlike the first unit, the new one had two major differences: First, it has a serial port hanging out of its case for command-line debugging and, second, it hasn't shown the slightest inclination to stop performing its appointed duties.

So, now it appears that the problem may have been faulty hardware. Once again, I find myself wondering what the average user would do when faced with an uncooperative device. It appears that useful diagnostics in this situation are rarer than hen's teeth.

> I find myself wondering what the average user would do when **faced with an uncooperative device**.

Talking of odd and highly aggravating problems, I mentioned some time ago in Backspin the problems I was having with DNS lookups. At one time I thought it was due to Chrome's caching, but after I "fixed" that I realized Firefox was experiencing much the same kind of issues.

Over the last couple of weeks I tried all sorts of fixes (I did stop short of sacrificing chickens and praying to St. Jude, the patron saint of lost causes) but, try as I might, the DNS failures just got worse.

A friend with similar problems had tried using Google's DNS servers (8.8.8.8 and 8.8.4.4) with, so he claimed, success, but when I changed my 2Wire DSL modem's configuration to use those servers instead of the default ones specified by the AT&T DHCP server, nothing changed.

Then I had an ah-ha moment. I was letting the DSL modem act as a DHCP server for my network and, rather than telling my machines to use either the AT&T DHCP-assigned DNS servers or the ones that I

► *See* **Gearhead,** *page 28*

IT asked and answered

Ron Nutter and **Steve Blass** tackle your tough tech questions at tinyurl.com/yg2o434

Although our corporate standard does not currently allow the use of devices like the iPad on the wireless network, I think that may be changing soon. What is the best way to get the iPad on our network? – Anonymous

➔ I have been working on this in the lab for the past couple of weeks. The main issue is that the iPad currently doesn't support either 802.1X-WEP or Enterprise WPA/WPA2. Hopefully when OS 4.0 becomes available later this year that will change. For the iPad to be truly successful in the corporate world, Apple needs to address this issue. The ideal situation would be if you had a guest SSID that goes out through a separate connection to the Internet. In this case, you could have the iPad establish a VPN connection back into your network to gain access to company resources. Since you are going to have to use a SSID with a static passphrase, this would add a layer of security. Currently, the iPad only supports an IPSEC VPN connection. Once OS 4.0 comes out, I think you should see Cisco's AnyConnect SSL client that should help give you some connectivity options. Princeton has been one of the early institutions to identify a possible problem in how the iPad handles DHCP. This is another reason to establish a separate SSID for the iPad. Princeton and others have been able to work around this by either using a short DHCP lease time (I have seen reports of three to eight hours). Another workaround has been to use a static IP address. A static address may not be an option if you are using different subnet ranges in different buildings but the same SSID.

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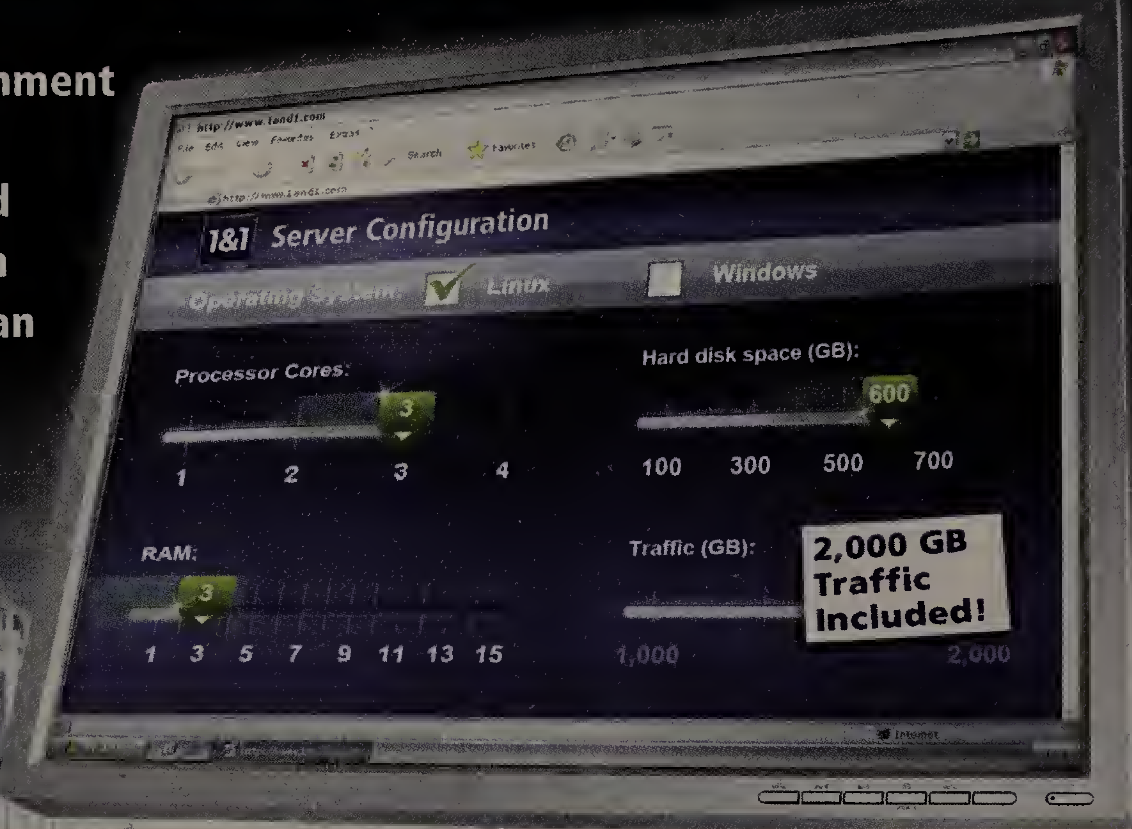

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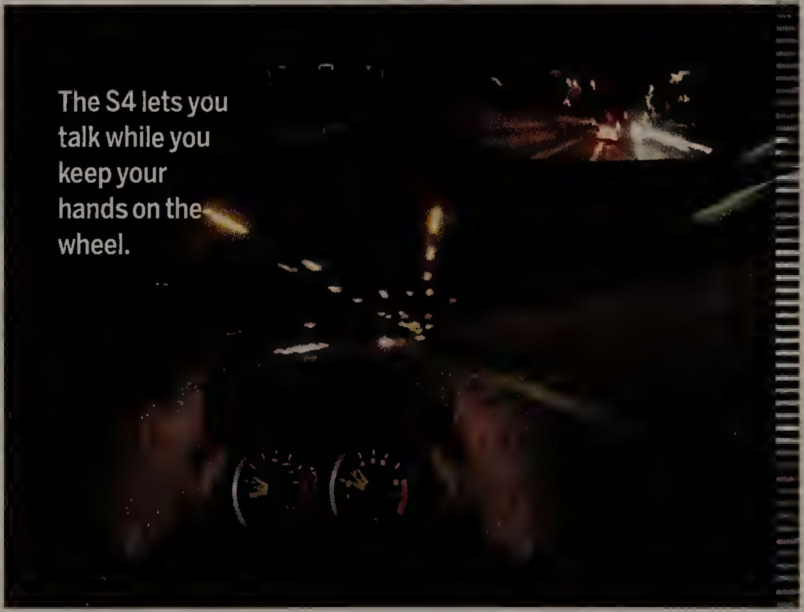
► **What it is:** Designed for mobile phone users who make a lot of phone calls in their car, but don't want to wear a Bluetooth headset, the S4 is a visor speakerphone that connects via Bluetooth, and includes voice control. This lets users make and answer calls with their voice (as long as voice dialing is supported on their phone). The S4 includes a high-volume speaker for louder audio playback inside a car, and wind, road and background noise reduction for clear calls on the recipient's end. The S4 comes with a magnetic clip that you can attach to your sun visor, and it charges via cigarette adapter or USB port on a PC.

► **Why it's cool:** The "true handsfree" aspect lets you avoid digging through your contacts list when making a call, and the ability to answer a call with your voice also means you don't have to fumble for the phone when a call comes in. Like BlueAnt's Q1 voice-controlled headset, the prompts are used to walk you through the easy pairing process, and you can always ask what commands you can say. The speech recognition is very good; you don't necessarily need to enunciate perfectly, as long as you say the right commands (or come close). The S4 also includes text-to-speech technology that can read out the name of the incoming caller, and works with Vlingo's SafeReader service, which can convert incoming messages to speech. Audio streaming (A2DP) also lets you play music from your phone to the speaker, as well as GPS voice directions, if the A2DP profile is supported by the phone. Another interesting feature is support for information services through the "Favorites" command. This includes getting information such as news, weather, traffic, movie times and more through a partnership with the Bing 411 service.

► **Some caveats:** The biggest issue I found was with echo — when the volume is turned up high on the speaker phone, the recipient often hears their own words echoed back, which is distracting. Blue Ant suggests turning down the volume on the speakerphone until the echo goes away, but that could mean you wouldn't be able to hear the caller. This could be eliminated completely by using the Q1 instead of the S4, but then you get into issues of having to wear a headset, which you are trying to eliminate to begin with. Another issue — older phones, including the iPhone 3G, don't support voice calling, so a lot of the cooler phone features, like saying "call home", aren't supported.



The S4 lets you talk while you keep your hands on the wheel.

► **Grade:** ★★★ (out of five).

Shaw can be reached at kshaw@nww.com.

TRUE FACT

24 PB

Amout of data Google processes each day.

SOURCE: COMMUNICATIONS OF THE ACM

NOTE: 24PB = 1,000 TERABYTES

► **Gearhead,** *from page 26*

specified, the DSL modem was telling all callers to its own DNS proxy. In other words, if the DSL modem was 10.0.0.1 then any machine that got its configuration from there was told to use 10.0.0.1 for DNS lookups, so if anything were amiss with the modem's DNS proxy service, then every machine would experience problems.

To work around the problem all I had to do was tell my machines to dynamically get their IP addresses from the DSL modem DHCP services but use the Google DNS servers I specified for domain lookups. Voilà! Problem solved!

So, it appears that the 2Wire DSL modem is slowly and deviously collapsing.

First the Wi-Fi started acting flaky then the DNS proxy misbehaved and, guess what, there was not one test in the DSL modem that could help. Again, how does a non-technical person or a technical person who has better things to do sort this stuff out?

Once I get the modem changed out, my network should be fine. Until the next thing breaks. Next week, we'll look at a promising disk imaging utility and a couple of very interesting books. ■

Gibbs has given up on the hen's teeth in Ventura, Calif. Your magic solutions to gearhead@gibbs.com.

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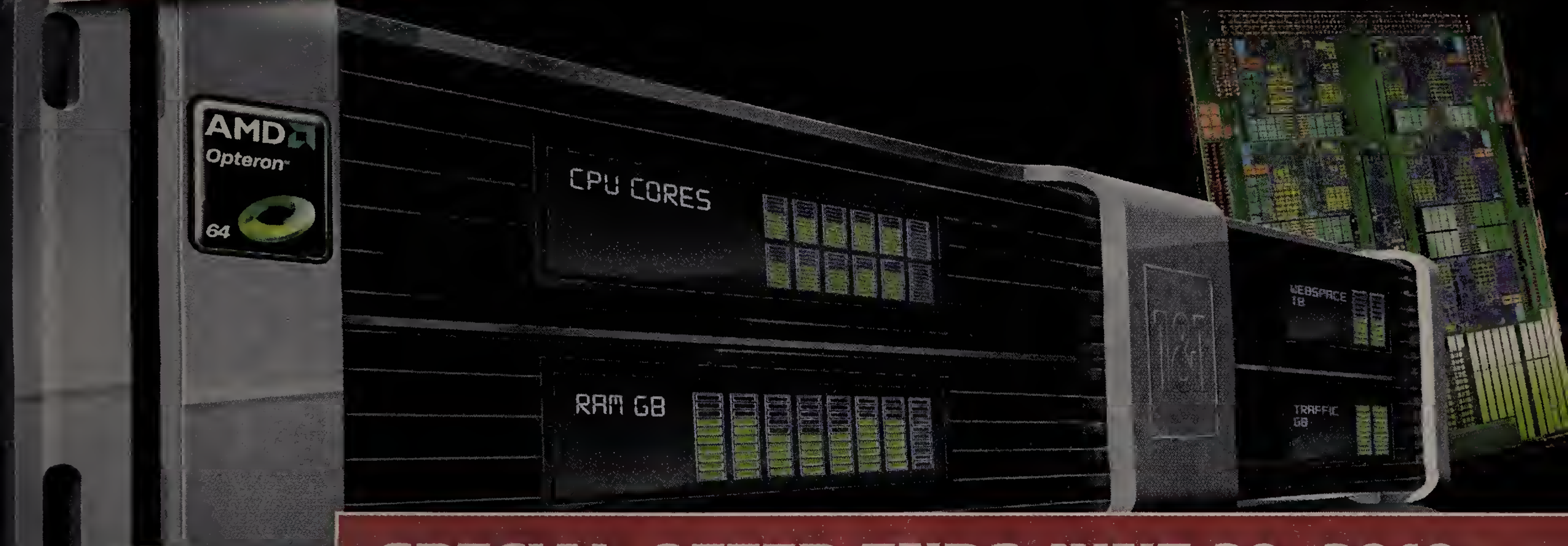

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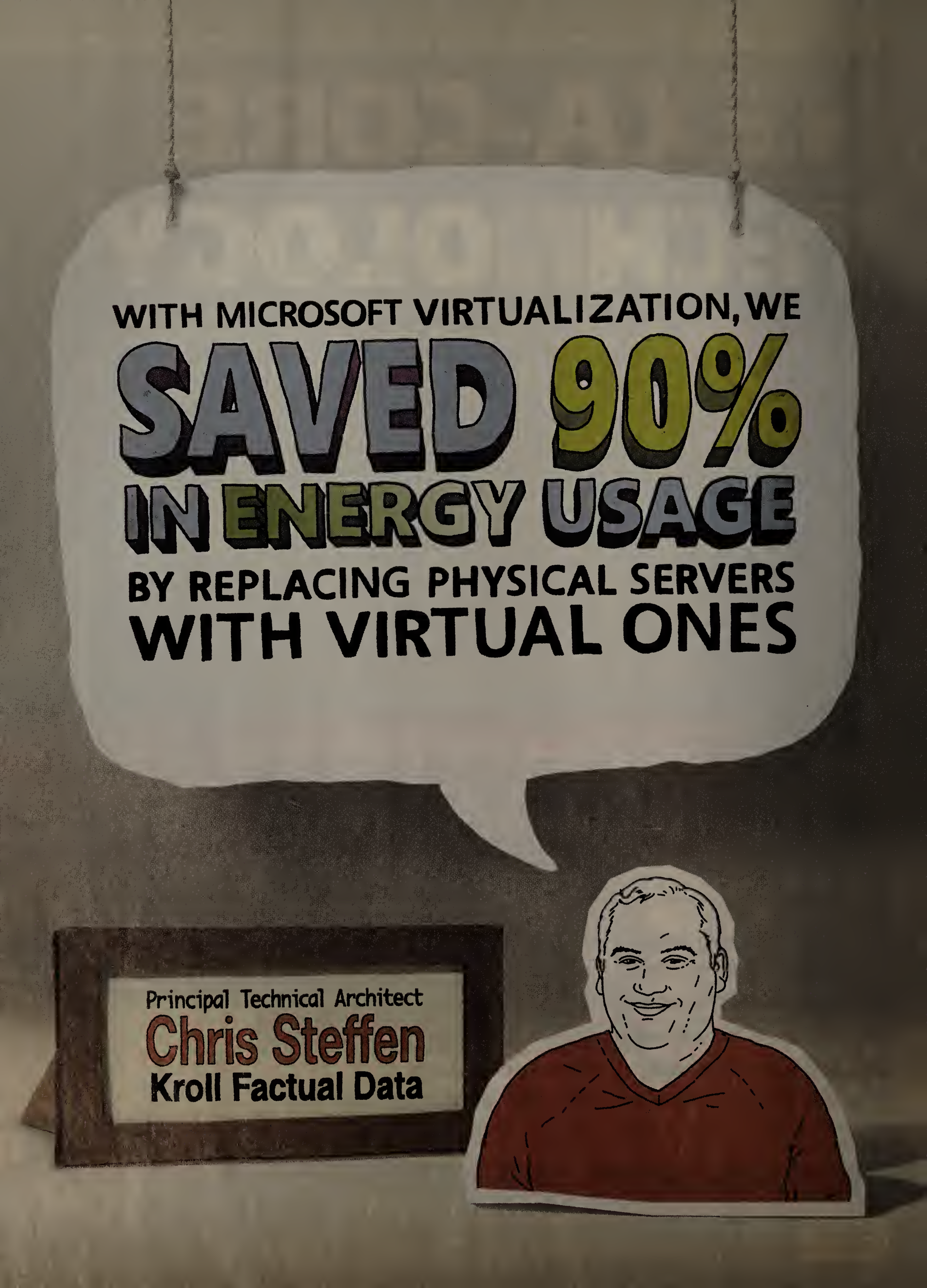
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CLEAR CHOICE TEST: CLOUD MANAGEMENT: PART II

Fly the public cloud on autopilot

Powerful automation tools help manage cloud-based jobs from start to finish

BY TOM HENDERSON AND BRENDAN ALLEN

CLEAR CHOICE TEST

One of the promises of the public cloud is the opportunity to quickly dial up server resources in order to do a job that calls for heavy-duty batch processing. But first you need a way to manage the life cycle of that job. Fortunately, there are tools that can automate setting up and tearing down jobs in the public cloud.

In this ground-breaking test, we looked at products from RightScale, Appistry and Tap In Systems that automate and manage launching the job, scaling cloud resources, making sure you get the results you want, storing those results, then shutting down the pay-as-you-go process.

We found that each product gets to the finish line, but they each require some level of custom code and they each take different, vastly circuitous routes.

We liked RightScale's ability to both monitor and control application use, as well as its wide base of template controls and thoughtfulness for overall control. RightScale's RightGrid methodology manages the full life cycle of apps and instances, and gave us the feeling that hardware could truly be disposable in the cloud.

IN THIS REAL-WORLD TEST, WE WERE ABLE TO COMPLETE OUR TASKS USING AN EXTRAORDINARILY LOW AMOUNT OF OUR AMAZON PROCESSING BUDGET.

Yet with a bit of work, we found that both Appistry and Tap In Systems offered task automation components that could also be successful for cloud-based jobs.

In our first public cloud management test, we focused on the ability of products from RightScale, Tap In Systems and Cloudkick to simply monitor public clouds like Amazon's Elastic Cloud Compute (EC2), GoGrid and Rackspace.

This time around, our test bed was narrowed to Amazon's public cloud, and we used a variety of Amazon cloud services, including Elastic Compute Cloud (EC2) server resources, Simple Queue Service (SQS) queuing system, and Simple Storage Service (S3).

The good news for enterprises is that Amazon's pay-per-usage model can be a major cost saver. In this real-world test, we were able to complete our tasks using an extraordinarily low amount of our Amazon processing budget.

Similar batch job cost savings can be realized using Amazon competitors such as GoGrid, RackSpace and others, but only if the tasks are automated using the type of cloud management tools that we tested here.

Bundle up

The basic procedure was similar for all three products. A job that needs to be performed requires application code, data files, a place to process the data (the cloud), and a place to put the results.

There are two options: make the job into a bundle where we could define code, data, outputs and options, or do that plus have a controller get messages from the job in progress. That allowed us to take either pre-defined actions based on the messages, or allowed us to change what happens in the middle of a job.

First, we needed to create an Amazon execution image with the applications we would be using for automation. We chose ffmpeg, an application suited towards video-rendering jobs for processing by arrays.

Once created, we bundled the image and uploaded it to Amazon so we would have a copy to start with. Each product then varied in terms of controlling the life cycle of the bundle. Typically, the life cycle is the sequence of events that coordinates the process of doing jobs and gathering the results, storing them and reporting success/failure (there will inevitably be both).

We gauged success by the degree of built-in controls, application customization that was necessary, how the management application would either programmatically or automatically scale resources to execute the job (by reading CPU or other resources, then adjusting jobs to add servers or resources), and communicating messages among job executors and coordinating processes.

RightScale

RightScale's flexibility became readily apparent early in our testing. RightScale's ServerTemplates can be modified, and the orchestration needed to perform jobs from beginning to end doesn't require bundling all components prior to job execution, as the other vendors did.

By modifying the ServerTemplates, we didn't need to create our own bundled image on Amazon using its EC2 tools, in effect, making the process that much simpler. But, like the other cloud management providers we tested, RightScale requires a bit of scripting work to make it useful.

RightScale uses two kinds of server application platforms. The first type of server array is queue-controlled. Jobs are placed into a queue, and depending upon resources that have been set, they execute in a first-in/first-out fashion. The second type uses monitored alerts to trigger actions that branch the job's processing instructions.

RightScale's RightGrid platform is based on the queue-based array model, which we focused on because it's the more convenient job control mechanism.

The queue-based processes connect with Amazon's SQS allowing RightGrid to pick desired jobs from a queue for service and processing. It's like an assembly line for batch jobs.

A RightGrid job coordinator (which is a server process located somewhere) uses a script that sends the work via the Amazon SQS. The worker instances pick up the job, get the salient work files, then do the work. If there's a lot of work in the queue, depending on our settings, the array could launch more servers. Input, output and audit queues are automatically created. We borrowed the framework for these queues from RightScale's demo application.

As an example, running a job might consist of building a job process; sending the job to the input queue; waiting for messages regarding job starts; delivering messages about progress, expansion of resources to service the job, or job completion; and then storing results to Amazon's S3 storage.

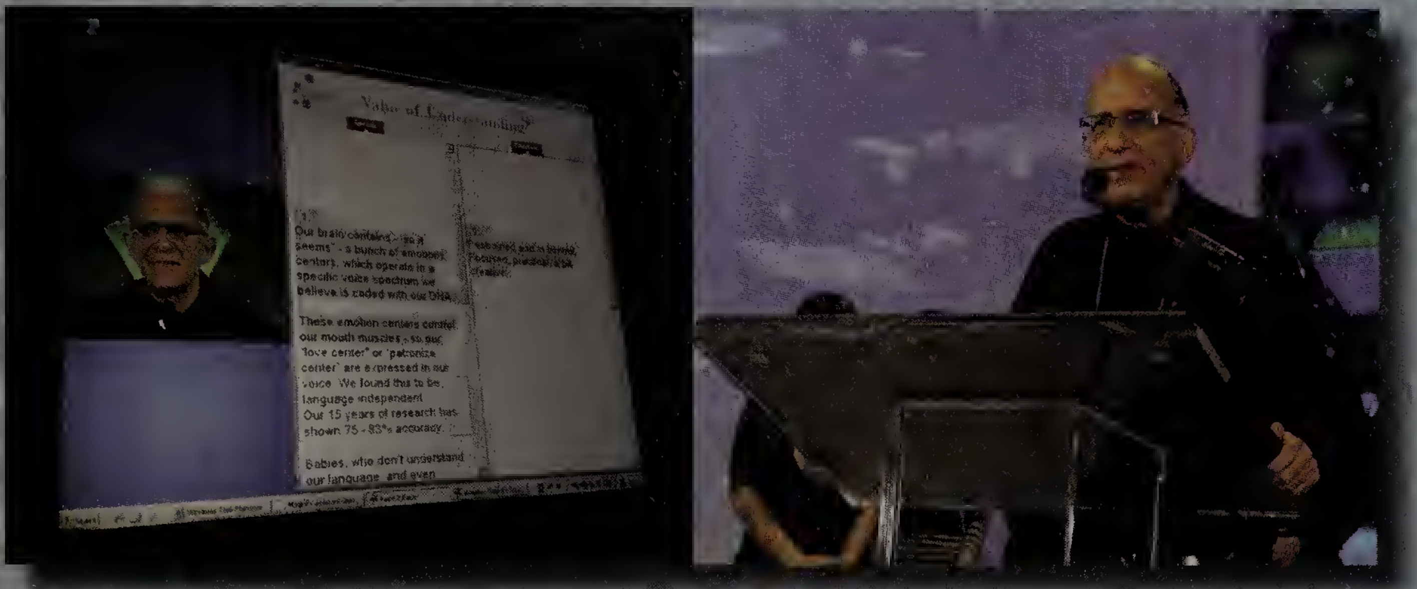
Modified representative scripts handle it all. The data from the output queue can then be sent into a database, as an example.

Variations on a script

We weren't locked into one language for scripting the templates, as RightGrid can use many languages, including Ruby, Python, bash shell, Java, plus whatever commands we could invoke from a command line.

We found it easiest to use RightScale's

DEMO people's choice



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NETRESULTS

Product	**RightGrid**	**Control Plan Editor**	**CloudIQ**
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Pricing	Free dev edition; otherwise $2,500 plus $500 a month and up.	$1 per instance per hour.	Free community edition; otherwise $199 per instance annually. CloudIQ Engine is $699 per core annually. CloudIQ Storage is $249 for 1TB annually.
Pros	Plentiful examples of specific applications; loads of functionality.	Highly sophisticated modeling; excellent GUI for control plan.	Wide cloud compatibility; plentiful code compatibility.
Cons	Complicated configurations.	Steep learning curve.	Not designed for batch-focused jobs.

pre-made configuration message encoding system, which is written in Ruby. The entire grid doesn't have to be written in Ruby, just the worker control files. Workers are process controllers that come in two varieties — one-shot and persistent.

RightGrid commonly uses one-shot workers to service processing queues. Persistent workers are used when the application requires a lot of front-end start-up processing.

Alert-based arrays can scale up or down based on certain conditions (such as CPU usage, memory usage). This is useful for scalable applications such as Web sites. There are a couple of familiar options when creating this type of array, such as min/max number of servers, just like queue-based arrays. But mostly alert-based arrays are completely different.

A couple of options of note: Per each alert are the decision threshold, resize by, and resize calm time options. These are used in determining when, how many and how often to scale up or down. There are actually tons of conditions that can be checked for this, not just CPU and memory.

RightScale demands a knowledge of scripting (and perhaps Ruby) to launch scalable, event or queue-driven jobs. Coupled with its superior monitoring, we liked RightScale the most for scalable batch jobs. Its downside is that it works only with a couple of cloud providers, Rackspace and Amazon, although it could do so interchangeably. It's efficient in its use of the costs of online resources, and managed the life cycle of job control very well.

Tap In Control Plan Editor

Tap In Control Plan Editor is an automation tool using the Petri Net model, which is a math transform describing distributed systems — just like the cloud.

With the Tap In tools, it's possible to create a Plan to automate tasks depending on certain Plan conditions. There are a number of example Plans included with the program, and numerous specific functions are available for cloud platforms such as GoGrid, Amazon EC2, Rackspace and Terremark vCloud.

The Plan Tool is central to how Tap In Control Plan treats jobs. At each Plan branch, there can be different conditions in which you can run scripts, which can be written in Ruby, Java or Groovy. You can have inputs and outputs from each branch, which can be passed on to the scripts or the next point in the job process.

We found that Tap In's sample scripts were out of date (the latest versions of Ruby scripts were included but old files were referenced in the samples), and we had to do a bit of modification to them to get them to work. Fortunately, the sample code didn't need to be changed much — just the 'include' files and cloud site logon information. This should be fixed by the next release, according to Tap In.

The Tap In user interface is similar to a flow chart editor where we could put circles, squares and triangles, then connect them together. Although this seems simple, the diagrams can become quite complex based on the Petri Net model controls of these symbols. Your Boolean logic and math classes pay off here.

Within each circle in the Plan, called places, code can be running from Java, Ruby or Groovy sources. Code can also be placed in the transition shapes. As an example, a square symbol means an 'or' transition, hexagon means an 'and' transition, triangle means thread split/join, and/or triangles can mean also more advanced Boolean/Von Neumann states such as interrupts and interrupt handlers.

We used Ruby as a test language. After creating a place or other transition, we used a line to connect two places. We then built a basic Control Plan model based on Tap-In's Amazon sample files.

The idea for our Control Plan was to perform a job that would scale up by launching more instances when there were video files in an Amazon S3 bucket. Inside this bucket were videos that we wanted to encode to a different format.

In our test model, we created a place to begin, and looked to the next place in the diagram to check our queue. The CheckQueue place contained inputs for our Amazon EC2 credentials, and the credentials were passed into the Ruby script. The script then checked if there were any video files in the Amazon S3 bucket.

If the queue was empty, the program logic would wait for a few minutes, and check again. But if files were found, the program logic would start the scale-up process, which would check if our server image was available. If our server image couldn't be found for some reason, then we would stop the process cold.

Otherwise the application logic would launch an instance, move the video file to another bucket directory, and send a message to the instance to start processing the video, using the user-data for Amazon instances.

Next, the test application logic checked to make sure the instance was up and running. If it wasn't, the application logic kept checking and waiting until the instance came alive. Our video-rendering app would then run, depositing its result back into our preset Amazon S3 bucket.

The Control Plan Editor allowed us to go through, step-by-step, to test/debug our scripts. There is a built-in source code editor to modify the scripts, along with a console to show output from each script run. Each place/transition has a separate console available to watch progress as well.

The documentation on Tap In's Wiki is useful for digging deeper in the Petri Net model.

There are a lot of sample files to play around with, as well as numerous scripts. It's also possible to connect with Tap In System's other product, Tap In Monitor, to get detailed monitoring information about your instances.

The developed model can be run again and again, but it is not really run in the background, you must keep it open, although Tap In Systems claims it is working on a control plan server which will be able to use these models via the xml files that are generated in a more automated way.

Tap In Systems Control Plan has several qualities going for it: interesting visual flow control of distributed systems with excellent control logic, a diverse number of sample

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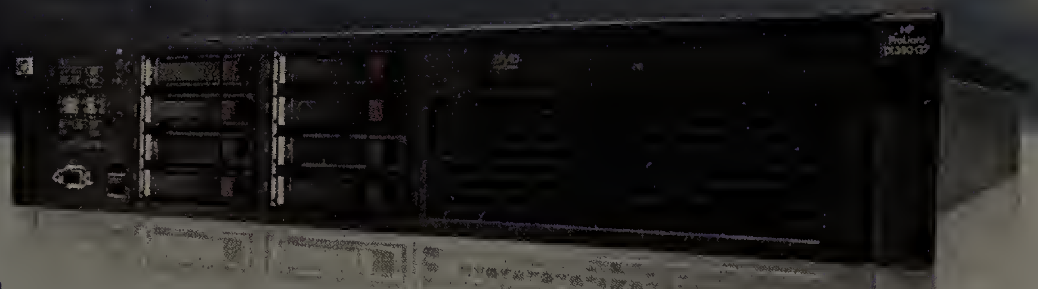

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[2] HP Insight Migration Software and HP Insight Remote Support automate most migration and monitoring tasks.

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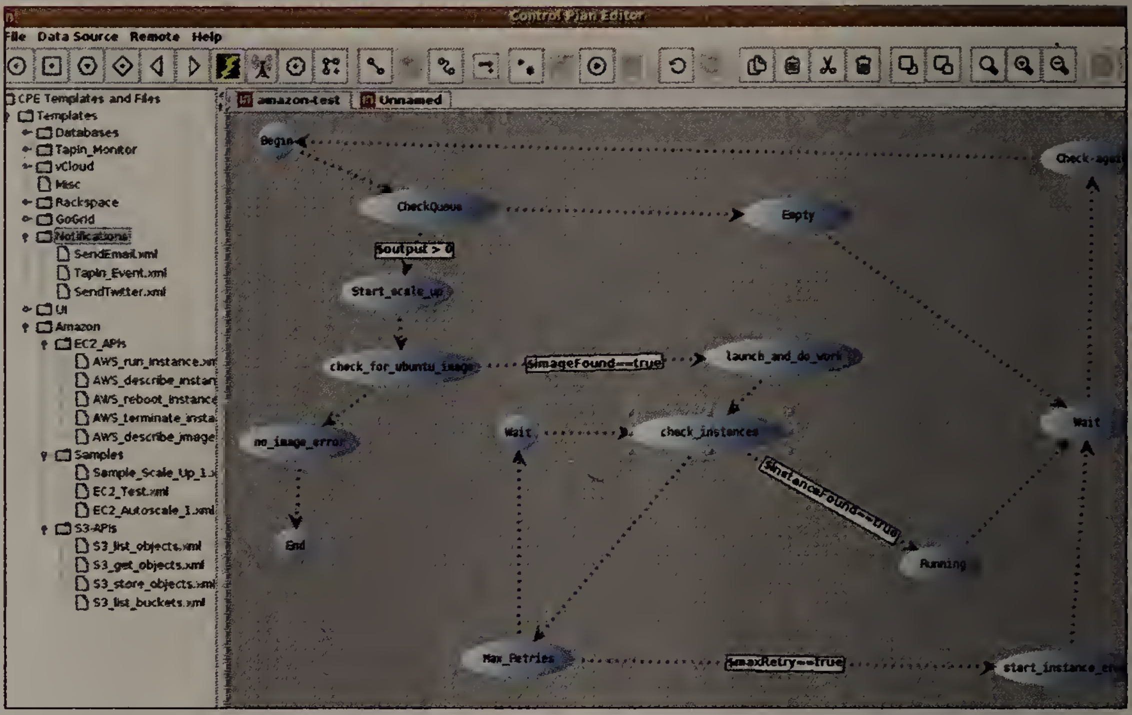
plans and scripts to glean from, the best compatibility with cloud service providers we've tested so far, and capacity for enormously sophisticated cloud models.

What hobbles Tap In Systems are a couple of weaknesses. Its monitoring of systems and instances is far less mature than RightScale. And Tap In's Control Plans require a fairly steep learning curve. Nonetheless, there's great power here, and lots of geek appeal. At press time, a Control Plan Server became available that orchestrates multiple Control Plans.



Tap In Systems' Control Plan Editor bas a highly visual interface, based on the PetriNet model.

Appistry — CloudIQ

By contrast to RightScale and Tap In Systems, Appistry doesn't have any automation for scaling the number of instances used for application processing. New job-processing instances must be built manually and inconveniently by comparison.

Appistry lends itself towards more persistent application use, rather than the concept of the public cloud's 'disposable hardware'. Instead, Appistry instances can be predefined to accept distributed work among its pre-allocated worker instances.

Fortunately, other Appistry processing parts can be highly automated and Appistry lends its power specifically towards Web instances and development. To get the best automation results, we found that you need to build your applications more or less around Appistry — although it's not required. Appistry applications at a minimum need a wrapper built around application unless Java, .Net, and/or C/C++ code is used to talk to Appistry's CloudIQ Engine.

We tested Appistry on Amazon EC2, although it's also supported on GoGrid and private clouds. Installation is easy, although after launching the first instance, we needed to copy the Private DNS host address into the user data of each subsequent instance so the others can find the first instance on Amazon Machine Images.

If you use it on your own private cloud (on your own network), the instances should be able to find each other through multicast. We occasionally found communications problems among components of Appistry instances and processes on Amazon.

The CloudIQ Engine is a runtime container for Java, .Net and/or C/C++ code. It's also possible to create other 'wrappers' around code and executables in other languages. The console displays fabrics, which are the framework of cloud instances that workers process within.

The console can be accessed on any of the instances within the fabric, and the fabrics can be woven together through instances of the Appistry Network Bridge. Console access requires a browser, an instance of Java, and Adobe Air. The CloudIQ engine can launch tasks, which will then be taken care of by the fabric workers.

The CloudIQ Platform user interface divides a fabric into applications, services, packages and workers. Applications monitored are fabric processes that use services, existing in packages, which are, in turn, attended to by workers. The fabric's work output is homogeneous, as workers have identical processes running on them. The fabrics can be linked together to create dependencies among the workers' discrete fabric processes.

CloudIQ Storage is similar in concept to Amazon S3, and in a way competes with S3. Each instance of CloudIQ Storage can be in different locations but they all work together as one group and look like one virtual drive. Generally, CloudIQ files are synced with each other (for example, the same files are located on each storage location).

In the case of the Amazon Appistry images, the CloudIQ storage is built into the image which means by default the storage will disappear along with the instances, unless you change the default directories to Amazon Elastic Block Storage (EBS) volumes (which is what we did at first, but ran into problems when terminating instances). This also means that storage is pre-allocated, and finite within the instance by default.

In our testing, we created a wrapper program to launch the ffmpeg video rendering application. We used the CloudIQ engine coded in such a way that if we launched the client multiple times it would distribute a task to another fabric worker. When the work was done, we copied the results over to a single EBS volume attached to the first instance. To access the files in the storage and control the storage process, we could use the 'curl' command to send http requests to do things like delete, deploy, get, put, stop and some other things.

There are three different types of programs installed onto a fabric: a fabric application that's a batch processing application or computing application; a service such as Tomcat, Weblogic or Apache; or a package such as Java Development Kit (JDK), Ruby, RPM or command-line installation like "yum install".

Appistry is a sophisticated construction set for distributed cloud computing, but generally for more persistent applications. Its monitoring and reporting infrastructure relies on mostly external tools, when compared to the instance monitoring capabilities of RightScale and Tap In Systems Control Plan.

Appistry can use a variety of code that can be linked in with the Appistry APIs to produce a distributed system (or set of systems) if you're adept at coding the project, and Appistry's success is fully dependent on lots of custom coding. The results, however, could be very useful. But first, you need to get through the 1,400 pages of documentation. Fortunately, paid customers get dedicated systems engineering help, and there's available architectural support as well. ■

Henderson is managing director and Brendan Allen is a researcher for ExtremeLabs, of Bloomington, Ind. Henderson can be reached at thenderson@extremelabs.com.

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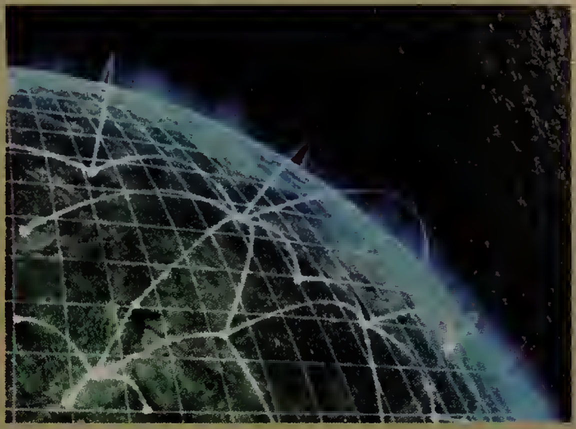

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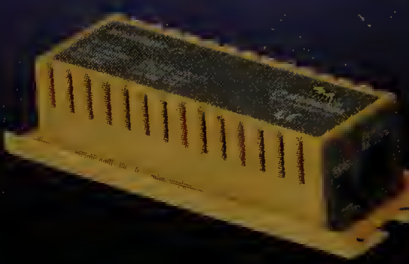

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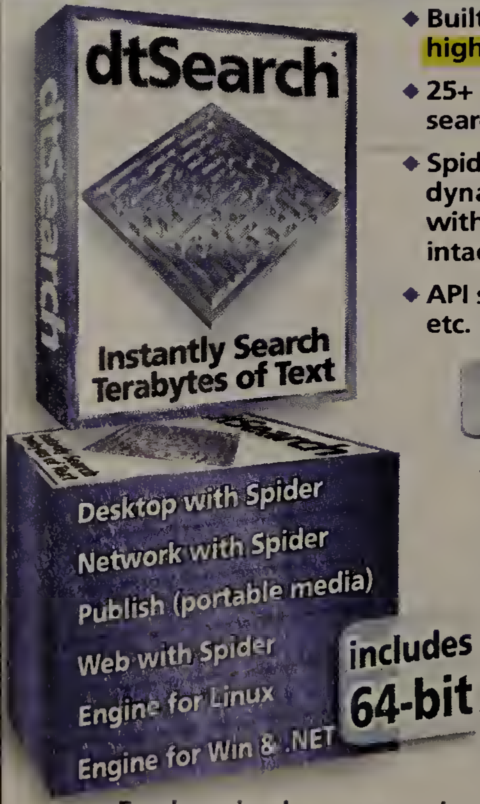

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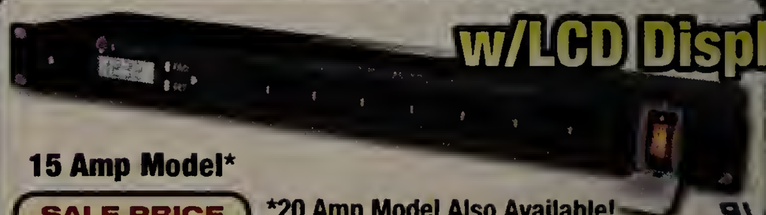

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BACKSPIN | BY MARK GIBBS

An open letter to Dan Hesse, Sprint CEO

DEAR MR. Hesse,

May I call you Dan? I'll assume that will be a "yes." Well, Dan, you're probably wondering why I'm writing. Could it be because of the TV ads Sprint has been running recently? Nope, it's not that, although while we're on the topic I feel compelled to tell you they aren't very good.

All that "I'm just a guy" thing doesn't work, particularly when you pitch the same old rhetoric that the whole cellular industry keeps recycling ... you know, tired old saws about "Our network is engineered for today and for tomorrow" and "This could be the only phone you'll ever need" (the latter being the silliest assertion ever).

Anyhow, what has me writing is to say "goodbye." What is it that's making me abandon the Sprint ship and head off to new seas of service? Well, it started with the call quality; out here, in the boonies north of Los Angeles, call quality has been good at best, but usually just adequate.

You, like all of the cellular service providers, bang on about your low levels of dropped calls when just about every consumer will tell you they get randomly disconnected often enough to be unimpressed by any such claim. You guys don't get it; you may have the lowest rate of dropped calls, but if we get any drops at all we see that as failure. One in a thousand is the same to us as one in a hundred:.

But what is really pushing me away is this sorry tale. The display on my wife's phone stopped working. As we had opted for your freebie phones we hadn't bothered with insurance, taking a gamble on the phones lasting until contract termination. To investigate my options I started poking around your Web site (which needs some serious usability testing, by the way) for a replacement phone and discovered Sprint really doesn't get it.

One of your cheapest phones, the Samsung Seek, costs $229, but with a new two-year contract and various discounts it turns out to be free. For me, as an existing customer with one year into a two-year contract, this phone with online upgrade pricing (a $75 discount ... woo-hoo!), works out to $154.99 and would lock me into a new contract that would keep me hooked to Sprint until June 2012.

If instead I decide to leave Sprint, the pro-rated early termination fee on my contract works out to $110. So, I could pay the ETF and go to, say, Verizon, and score my wife a BlackBerry Curve for $30, and be $15 better off! (Actually, for the $30 I would get two Curves.)

I called your customer service (which is a hopeless mess of poorly trained drones relentlessly and irritatingly trying to sell-through and plead for high satisfaction survey ratings ... so sad) and after two tries that subtracted 30 minutes from my life managed to get to your customer retention department.

I explained the logic and asked if they wanted to keep me as a customer. The answer was — no surprise here — no, they did not. Unless I paid for the crap phone and re-upped there was nothing they could do. Your marketing department is obviously not doing its job.

So, Dan, it's goodbye. I won't miss Sprint and you've given me no reason to stay. See you on TV. Or better yet, I won't.

Yours sincerely,

Mark Gibbs, Ventura, Calif.

PS. You can reply to backspin@gibbs.com.

PPS. I can provide marketing consulting.

NETBUZZ | BY PAUL MCNAMARA

Congress needs to pass anti-SLAPP legislation

PERHAPS YOU'VE read of the Michigan college student who responded to his car being towed —unfairly, in his mind — by posting a Facebook page entitled "Kalamamazoo Residents against T&J Towing." It seems he wasn't the only one tired of getting an indiscriminate hook from T&J and his protest soon attracted hundreds of like-minded individuals who also posted unkind words about the company.

And that ruckus attracted a lawsuit by T&J, which figured the best way to squelch such criticism was to intimidate its leader into silence. This legal tactic has had a name that pre-dates the Internet: strategic lawsuit against public participation, or SLAPP.

The good news is that the publicity surrounding this case may help motivate lawmakers in Washington to finally pass a federal law that will protect free-speech rights — online and off — from unmerited legal retaliation by deep-pocketed businesses. The need for such legislation becomes clearer by the day.

From a *New York Times* story examining SLAPP suits last week: "Web sites like Facebook, Twitter and Yelp have given individuals a global platform on which to air their grievances with companies. But legal experts say the soaring popularity of such sites has also given rise to more cases ... in which a business sues an individual for posting critical comments online. ... The towing company's lawyer said that it was justified in removing (the) car because the permit was not visible, and that the Facebook page was costing it business and had unfairly damaged its reputation."

Who knows what the truth is about the location of the parking sticker ... and who cares? After all, if your right to take a complaint public hinges on first having absolute certainty that you are correct, well, who among us (not protected by a corporate legal department) will be willing to take that risk? Big business should be prohibited from suing critics into silence absent clear-cut evidence of fabrication and malice.

A number of states already have laws that attempt to deter this type of legal intimidation, but a federal version is necessary given the nature of the Internet and this country's well-established sue-first mentality.

This will be a classic test for a Congress that all too routinely aligns itself with business interests.

Reader helps us understand a zettabyte

A few weeks ago we tried to place into its proper context the scale of a zettabyte — 1 trillion gigabytes, or a 1 followed by 21 zeroes. EMC had offered a number of comparisons, the densest of which went like this: "707 trillion copies of the more than 2,000-page U.S. Patient Protection and Affordable Care Act signed into Law in March 2010. Stacked end to end, the documents would stretch from Earth to Pluto and back 16 times or cover every inch of the United States in paper 3 feet deep."

And at that point I broke out the surrender flag.

Others, however, do not give up so easily, witness reader Ted Zeh, who in an e-mail to me suggests this elegant comparison: "A zettabyte is about 1/5th of a Google."

Bingo! ■

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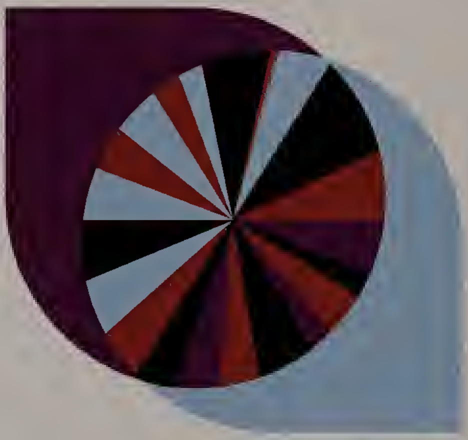

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